Dillberry Lake Provincial Park Biophysical Inventory

December, 1999

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SUMMARY

Dillberry Lake Provincial Park is located along the Alberta-Saskatchewan border in east central Alberta. The landscape is represented predominantly by undulating to hummocky terrain with slopes ranging on average from 2 - 20%, and occasionally as high as 75%, overlain primarily by coarse glaciofluvial and eolian sediments of Pleistocene origin. The northern part of the Park consists of glaciofluvial ice contact landforms marked by numerous pothole lakes (or kettles) which typify knob and kettle terrain. In the southern part, these coarse deposits have been reworked by wind creating eolian sand dunes, which for the most part have stabilized over time. Currently, active blowouts are evident in some areas amongst the dunes. Small areas of coarse to fine lacustrine sediments are found exposed around the shorelines of lakes located in the Park.

Glaciofluvial and eolian sands are the predominant parent material of most soils in the Park. Chernozemic soils, predominantly Orthic Dark Brown Chernozems, have developed under grassland, shrubland and woodland plant communities on these glaciofluvial and eolian parent materials. Regosols occur in blowout areas created as a result of wind action on unstable sandy surface sediments. Gleysolic soils are common in lacustrine sediments along lakeshores and in pothole depressions where the water table lies close to the surface. Organic soils occur along the shorelines of lakes in the Park such as Dillberry and Long Lakes, and in small potholes or ponds that are currently drying out.

In terms of its ecology, Dillberry Lake Provincial Park is located in the southern portion of Central Parkland Subregion, Parkland Natural Region, which lies north of the Northern Fescue Subregion of the Grassland Region. This proximity to the grasslands results in plant communities typical of the Parkland Region namely woodlands comprised of aspen (*Populus tremuloides*) and balsam poplar (*Populus balsamifera*) interspersed with grasslands consisting of numerous plant species commonly associated with the Northern Fescue grasslands.

The distribution of vegetation types on the landscape is determined by factors such as surface parent material stability, slope, aspect and moisture availability. Aspen woodlands and tall shrublands tend to grow best on rapidly drained north and east facing slopes while balsam poplar tends to prefer depressions and lake shore perimeters where drainage is poorer and nutrient availability higher. Low shrub and grasslands are typically located on rapidly drained drier south and west facing slopes. Wetlands are common along lakeshores and in pothole depressions.

Sand dune complexes are most prominent in the southern half of the park. A woodland of stunted aspen with an understory of saskatoon (*Amelanchier alnifolia*) and choke cherry (*Prunus virginiana*) stabilizes the north and east facing dune slopes, while the remaining slopes are covered by low shrubs such as buckbrush (*Symphoricarpos occidentalis*), dwarf shrubs such as creeping juniper (*Juniperus horizontalis*) and bearberry (*Arctostaphyos uva-ursi*), and open grassland. Low nutrient and moisture availability limit growth in active sand dune areas and plant succession occurs over a long period of time. However, once the terrain has stabilized, soil development can occur.

Several lakes are located within and adjacent to the Park boundary namely Dillberry, Killarney, Leane, Long, Speedy, and Ranger Lakes (the latter 2 are small officially unnamed pothole lakes named by the local people). Small wetlands are evident in several pothole depressions in the northeast end of the park. Local subsurface drainage is the primary water source for these lakes and wetlands. Killarney and Leane Lake are highly saline and possess extensive saline flats. Speedy and Ranger Lake are both small pothole lakes and appear to be slightly saline. The Park's two freshwater lakes, Dillberry Lake and Long Lake are also the deepest bodies of water in the Park.

The Park landscape contains habitat that is important to a number of endangered and threatened species of flora and fauna. The saline wetlands provide habitat for a number of avian species. The saline flats along Killarney and Leane Lake are prime nesting habitat for the endangered piping plover (*Charadrius melodus*). The lakes and the adjacent exposed flats are part of an internationally significant staging area for migrating shorebirds. Numerous plant and animal species of concern may also be found within the Park and are discussed later in this report.

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1. INTRODUCTION

Dilliberry Lake Provincial Park represents one of the few remaining remnants of relatively undisturbed natural landscapes in the Central Parkland Natural Subregion, and is listed as one of 15 currently protected areas representing the Subregion in Alberta (Alberta Environmental Protection, 1994). Much of the remaining area of this Subregion has been affected by agricultural activities, including grazing and crop production, and industrial activities, such as oil, gas and gravel extraction

The diverse nature of the Central Parkland Region is a result of its proximity to the Mixedwood Boreal Forest located to the north and the Northern Fescue Grasslands situated to the south. The Central Parkland possesses floral and faunal characteristics prominent in the grasslands and in the boreal forest.

Field assessments of soils, vegetation and landforms conducted in the summer of 1997 have been complemented by an extensive literature search to define the many features of the Park landscape indicated in this report.

2. OBJECTIVES

The primary objective of this inventory was the development of a comprehensive, standard baseline data set representing the terrain, vegetation and faunal features of Dillberry Lake Provincial Park. In order to fulfil this objective, it was necessary to:

- compile all existing information into one extensive data base,
- conduct field assessments to verify, refine and add to the existing information,
- standardize the data in accordance with the classification developed for protected areas management (Achuff, 1992; Alberta Environmental Protection, 1994a).
-

3. OVERVIEW OF CLASSIFICATION

The Dillberry Lake Provincial Park biophysical inventory is based on a modified version the Natural History Themes classification system developed for protected areas management (Achuff, 1992). This system provides a standard hierarchical presentation of data through the use of three natural history theme levels, each defining progressively more specific attributes of the landscape. Level 1 represents a landscape description on a broad scale based on the attributes of landform and parent material. Level 2 classifies the landscape based on broad vegetation types or physiognomic groupings (i.e. grassland, shrubland, woodland and wetland classes) and soil great groups. Information required at these 2 levels may be obtained from regional geology maps, air photos and reconnaissance field studies. Level 3 classification is based on more specific details often requiring more intensive fieldwork namely the dominant plant species present and prominent soil subgroups. Unique and special features such as rare plants or animals or specific habitats are also represented in Level 3 descriptions.

4. PARK INFORMATION

4.1 Location and Boundaries

Dillberry Lake Provincial Park is located 82 km south of Lloydminster, Alberta along Highway 17 adjacent to the Alberta-Saskatchewan Provincial boundary (see Figure 1). The Park is officially 988.229 hectares (Order in Council 339/95), and encompasses Sections (or portions thereof) 25, 26, 33, 34, 35, and 36 in Township 41, Range 1, and the southern halves of Sections 1 and 2 in Township 42, Range 1, West of the Fourth Meridian. The Park boundary, according to digital files provided by the Recreation and Protected Areas Division, Alberta Environment in Edmonton, does not include the Dillberry Lake basin, uncleared road allowances in the eastern half of the Park, sections of critical lake shore habitat along Killarney and Leane Lakes, and the southern portion of the northwest quarter of Section 33 in Township 41, Range 1, West of the 4th Meridian containing an active gravel pit. The total area covered by this biophysical inventory is 1086.06 hectares, which is approximately 98 hectares larger than the Order in Council area. It was decided in collaboration with the client, Derry Armstrong, Natural Resources Service to include additional area outside of the Park's official boundaries rather than run risk of excluding critical biophysical information.

The terrain in the Park ranges in elevation from a minimum of 620 masl (meters above sea level) along the shoreline of Leane Lake to a maximum of approximately 653 masl in the high sandhills, a short distance south of Long Lake and east of Leane Lake.

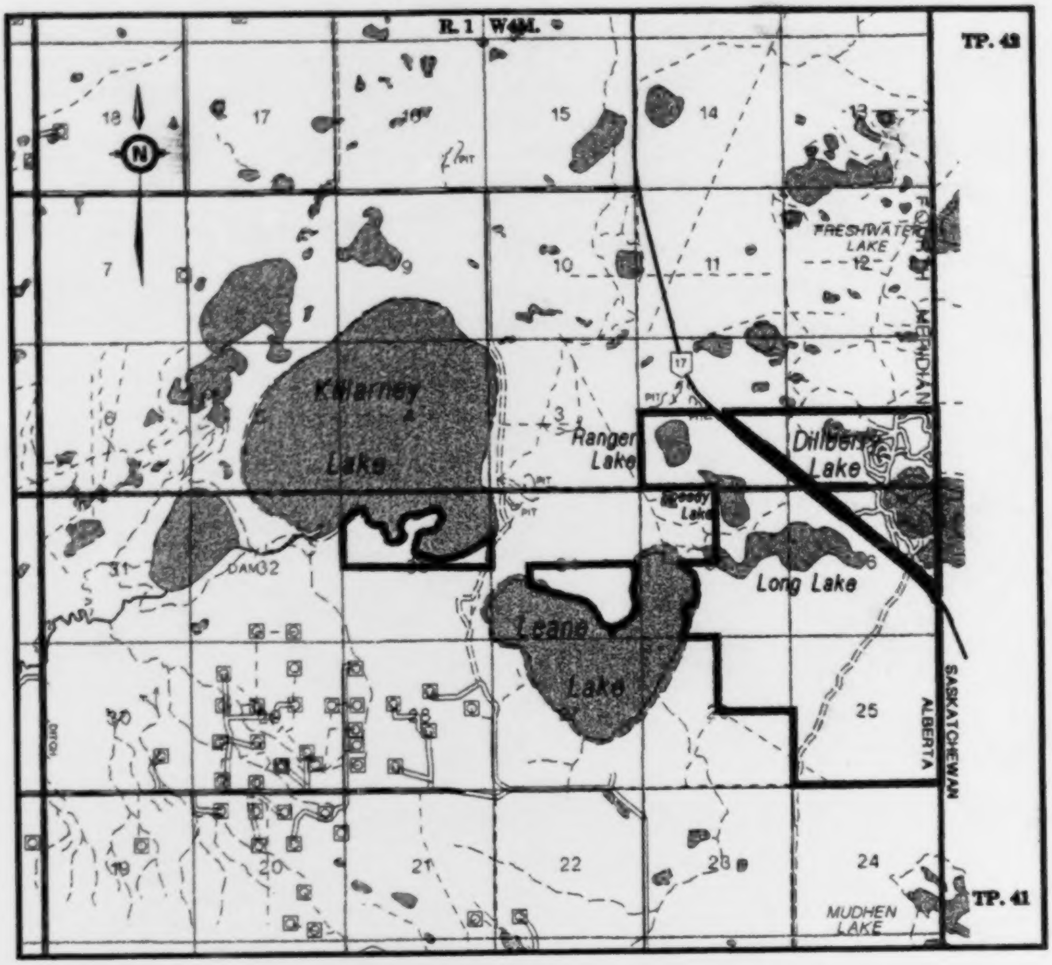
R. 1 W4M.
TP. 42
N
18
17
16
15
14
13
7
9
10
11
FRESHWATER LAKE
12
FOURTH MERIDIAN
17
PIT
Killarney Lake
3
Ranger Lake
Dillberry Lake
6
Speedy Lake
31
DAM
32
Long Lake
Leane Lake
30
28
25
SASKATCHEWAN
ALBERTA
DITCH
19
20
21
22
23
24
MUDHEN LAKE
TP. 41

Figure 1. Map of Dillberry Lake Provincial Park project area.

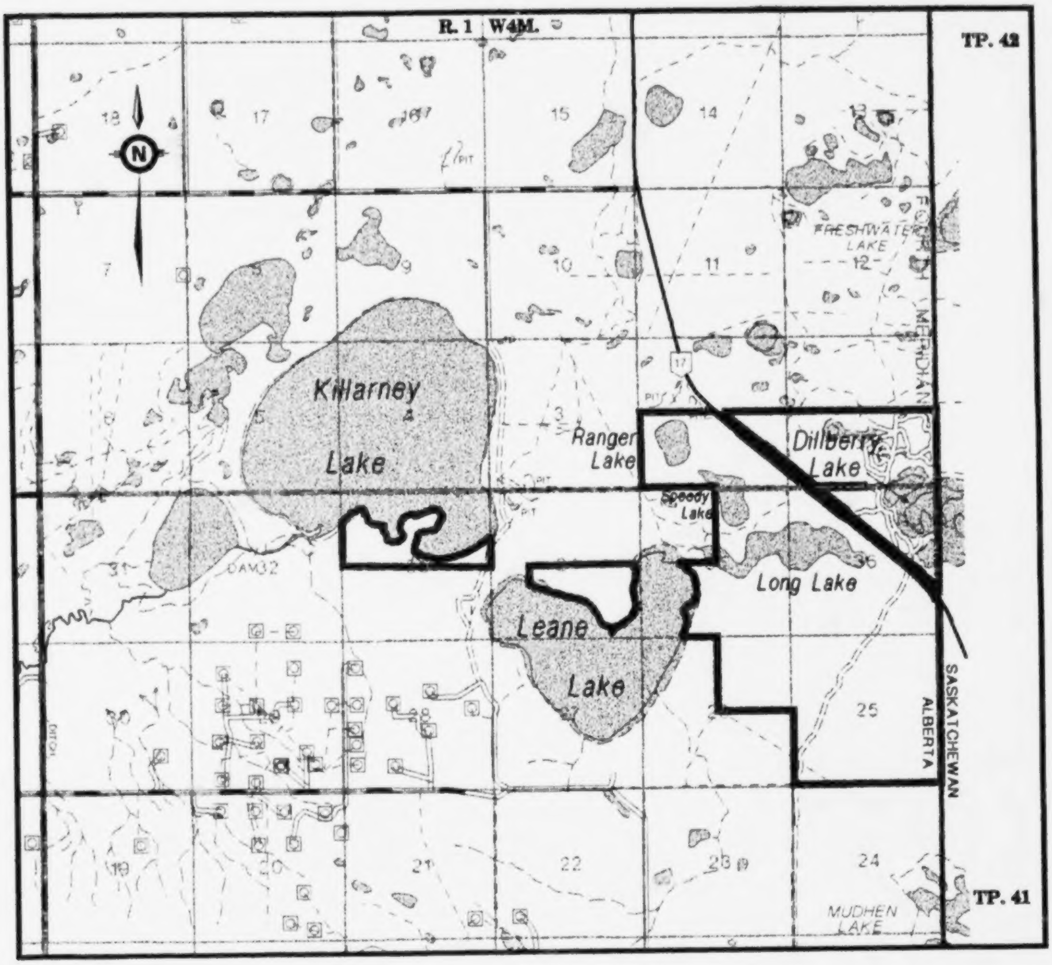
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Figure 1. **Map of Dillberry Lake Provincial Park project area.**

4.2 Park Establishment

Dillberry Lake was a popular recreation area with picnic sites and cabins as early as 1930. In 1932, a 78 acre parcel of land was reserved for a park. Dillberry Lake Provincial Park was formally established in 1957. Several annexations to the Park have occurred since its formation (See Table 1). The most significant additions have occurred in the last decade. In 1988, the Park area was increased 10 fold to include an area of sandhills in the southwest, and a small area of knob and kettle terrain in the northwest. The Park was extended to its current size with the addition of the southeast shoreline of Killarney Lake and a small area of adjacent upland (northern part of Sec. 33, Twp. 41, Rge. 1, W4M) in 1995.

Prior to the establishment of the Park, much of the area was used extensively for cattle grazing. Old furrow lines and introduced grass species observed in several field sample sites in the summer of 1997 indicates that some areas were previously cultivated. Past gravel extraction activity appears to have taken place in the most recent land acquisition south of Killarney Lake. Current gravel extraction is taking place in the northern part of Sec. 33, Twp. 41, Rge. 1, W4M included as part of this inventory project.

Year	Order in Council	Park Area acres (hectares)	Area by Legal Land Description
1932	586/32	78.40	land reserved for an Park in NE-36-41-1-W4
1957	18/57	78.40	Park formally established in NE-36-41-1-W4: represents area not covered by water during survey
1965	733/65	219.83	addition of SE-1-42-1-W4, represents area not covered by water
1972	1711/72	252.15	addition of that area of SE and NW quarters of 36-41-1-W4 lying north and east of surveyed roadway (Highway 17)
1974	1623/74	253.32	no description
1988	435/88	2336.84 (955.43)	addition of SW-1-42-1-W4, SE and SW quarters of 2-42-1-W4, remainder of 36-41-1-W4 not yet part of Park, SE, SW and NE quarters of 35-41-1-W4, SE quarter and eastern half of SW quarter of 34-41-1-W4, all of 25-41-1-W4, and NE-26-41-1-W4; represents area not covered by water
1995	339/95	2441.88 (988.23)	addition of northern part of NW quarter and NE quarter of 33-41-1-W4.

Table 1. Changes in Park Boundary since Establishment.

5. INVENTORY METHODS

5.1 Field Assessments

94 field sample sites were investigated in the Park from July 30th to August 7th in 1997. Site, vegetation and soils data were collected at each of these field sites (locations on Map 1 enclosed in the back). Sites were selected to represent the variability of natural landform and vegetation features evident in the landscape and on available air photos (See Table 2). These sites were further supplemented with landscape features of interest that became apparent during the fieldwork. Site, soils and vegetation data were collected according to the procedures described in the Ecological Land Survey Site Description Manual (Alberta Environmental Protection, 1994). Prevailing drought conditions during the summer presented some problems in identifying some of the plant species present due to their dead and desiccated state. Where possible, identification of plant species at least to the genus level was attempted and is provided in this final report. Plant taxonomy follows Moss (1983), and common names were taken from the Alberta Plants and Fungi - Master Species List (Alberta Environmental Protection, 1993). Any incidental faunal observations were recorded,

however, animal activity was at a minimum due to the unseasonably high temperatures experienced during the 1997 summer field investigations.

Date	Scale	Roll #	Lines	Photo #
97-05-09	1:15,000	AS4766	1 2	142-149 150-158
97-05-16	1:5,000	AS4766	1 2 3 4 5 6	69-79 80-90 91-104 105-118 119-130 131-141
95-06-24	1:20,000	AS4631	2	11-13
92-08-13	1:20,000	AS4306	18	98-102

Table 2. List of Available Air Photos. It should be noted that the clarity of the photos is highly variable due to the print quality and the time of year the photos were taken.

5.2 Classification and Mapping

Classification of the Park landscape was conducted in accordance with the Natural History Themes presented by Achuff (1994). Level 1 and Level 2 Natural History Themes were stratified on 1:5,000 scale black and white air photos flown in May of 1997. Level 1 themes are the broadest class and represent according to Achuff (1994) "major visible landform and biotic complexes, and highly siginficant major ecosystem types". Level 1 themes described for the Park represent for the most part landform complexes (Sandy Upland, Non-Sandy Upland and Wetland Level 1 types) subdivided into more detailed Landforms (new term applied to this project) namely eolian, glaciofluvial, lacustrine, moraine, glaciolacustrine, organic and open water. Level 2 themes are more detailed and include "broad vegetation types, soil Great Groups, bedrock classes, highly visible and large surficial geological components, and unusual vegetation assemblages and habitats" (Achuff, 1994). Level 2 themes described for the Park are primarily Vegetation Types determined according to the physiognomic structure of the vegetation communities (particularly in the uplands) and site moisture regime (more of a factor in wetlands). It should be noted that some classes, especially the shrublands and more specifically the dwarf and low shrub types, were difficult to stratify due to the low level of resolution on the air photos. This is possibly associated with the early time of year in the spring the photography was flown. As a result, the Level 2 Grasslands vegetation type includes the dwarf shrub communities and some low shrublands, particularly patches of very short buckbrush and juniper interspersed throughout the grasslands. All Level 1 Landform and Level 2 Vegetation Type polygons and codes were transferred on orthophoto base maps and digitized to form a GIS spatial database. The following 1:5,000 scale maps were generated using this spatial dataset and are enclosed in the back of this report:

Map 2 - Dillberry Lake Provincial Park Project Area (Western Portion)
Level 1 Natural History Themes - Landforms

Map 3 - Dillberry Lake Provincial Park Project Area (Eastern Portion)
Level 1 Natural History Themes - Landforms

Map 4 - Dillberry Lake Provincial Park Project Area (Western Portion)
Level 2 Natural History Themes - Vegetation Types

Map 5 - Dillberry Lake Provincial Park Project Area (Eastern Portion)
Level 2 Natural History Themes - Vegetation Types

An additional level (Level 3) was added to provide more refinement of the broad vegetation types and present more site-specific vegetation and soils information. It should be noted that no guide or system, similar to those developed for the green area (Beckingham and Archibald, 1996; Archibald et al., 1996; Beckingham et al., 1996), currently exists to define parkland ecosites and communities. The vegetation information for this report was qualitatively assessed. Vegetation communities were defined according to their dominant plant species (by cover) and soils subgroups. Many of the communities defined are similar to those identified in past studies (Schneider et al., 1997; Fehr, 1982; Fehr, 1984). This level is not readily mappable, however, it provides additional information on the plant species composition and their site preferences. Level 3 vegetation communities and associated soil subgroups along with Level 1 and 2 descriptions are presented in a large table included with the maps in the back of the report. Appendix 1 provides a summary of the soil, site and vegetation characteristics of the sites sampled in the summer of 1997.

6. CLIMATE

The climate influencing the Park and surrounding area is similar to that found in the prairie regions to the south. Warm, dry summers and mild winters (relative to regions to the north and west) are characteristic of this area (Alberta Environmental Protection, 1994c). Climate data presented below represents the most recent 30 year normals from the nearest continuously operated Environment Canada climate station located at Kinsella Ranch near Wainwright. This Central Parkland site has similar topography to the Dillberry Lake area.

This area receives 75% of its precipitation in the form of rain during the summer months (see Table 3). Daily maximum temperatures in excess of 20°C throughout the months of June, July and August (see Table 3) result in high rates of evaporation causing the very dry conditions evident in the Park and surrounding area.

Drought conditions occurred during the middle to late summer of 1997. Maximum temperatures exceeding 30°C were not uncommon during the late morning and early afternoon.

Month	Temperature (° C)			Precipitation			
	Daily Mean	Daily Max.	Daily Min.	Snow (cm)	Rain (mm)	Total (mm)[1]	Days[2]
January	-14.9	-10.3	-19.7	20.8	0.6	21.5	8
February	-10.7	-5.8	-15.7	13.5	0.0	13.6	6
March	-5.2	-0.6	-10.4	19.6	0.8	20.4	7
April	4.1	9.9	-1.8	12.2	8.7	20.9	5
May	10.9	17.4	4.3	1.3	39.6	41.0	9
June	14.8	20.8	8.6	0.0	83.9	83.9	12
July	16.7	22.8	10.5	0.0	75.7	75.7	13
August	15.9	22.3	9.4	0.0	59.9	59.9	12
September	10.2	16.2	4.4	0.9	36.7	37.6	9
October	4.5	10.2	-0.9	5.6	10.3	16.2	5
November	-5.8	-1.6	-10.1	15.0	1.9	16.8	6
December	-12.4	-8.0	-16.9	20.0	0.9	20.9	7
Year	2.3	7.8	-3.2	108.9	319.3	428.5	98

[1] **Total Precipitation**

[2] **Days of Measurable Precipitation**

Table 3. 30 year (1962 to 1990) Climate Normal Data for Environment Canada's Kinsella Ranch Location (53° 00' N, 111° 31' W; 705m ASL) (Environment Canada, 1993).

7. BEDROCK GEOLOGY

Bedrock in the Park and vicinity consists of the Upper Cretaceous Belly River Group. It is comprised of "grey to greenish grey, thick-bedded, feldspathic sandstone; grey clayey siltstone, grey and green mudstone; concretionary ironstone beds" of a nonmarine origin (Hamilton et al, 1999).

Wyatt et al. (1944) described the underlying geology in the Park and surrounding region as part of the Pale Beds and Variegated Beds Formations, which is also known as the Pale and Variegated Formation due to the difficulty in distinguishing the two strata in the field. The upper Pale Beds appear lighter due to the presence of bentonite, which becomes whiter as it weathers. The lower Variegated Formation consists of darker carbonaceous shales. This bedrock, ranges in thickness from 274 to

296 m, dips gently to the south-east and lies directly below unconsolidated glacial sediments deposited during the last major ice retreat.

8. TOPOGRAPHY AND LANDFORMS (NATURAL HISTORY THEME LEVEL 1)

Much of the northern part of the Park is dominated by a hummocky and pitted landscape, consisting primarily of ice contact glaciofluvial (Shetsen, 1990) or kame deposits composed of sand intermixed with occasional gravels. This landscape also known as knob and kettle consists of numerous small pothole lakes and sloughs scattered throughout the hummocky terrain.

More recently, in the southern and eastern part of the Park, the glaciofluvial sands have been modified by wind resulting in the formation of sand dunes (Greenlee, 1982). Much of the dune area has now been stabilized by vegetation. However, localized areas of blowout do occur, especially on steeper terrain.

Small areas of lowlying level to undulating morainal and glaciolacutrine deposits occur in the western portion of the project area south of Killarney Lake. These are part of a larger morainal and lacustrine landform system located west of the Park.

Level to undulating lacustrine deposits in the form of exposed lake bottom sediments and shoreline beaches are evident in and around water bodies such as Killarney Lake, Leane Lake, Dillberry Lake, Ranger Lake and Speedy Lake.

Accumulations of organic deposits are found in lowlying areas associated with major water bodies such as Dillberry Lake, as well as pothole depressions in the north-eastern portion of the project area. These organic deposits overlie local lacustrine deposits at depths ranging from less than a meter (veneer) to many meters.

Open water is evident in the form of lakes, and ponds in small local depressions. Section 13 provides more detailed descriptions of the lakes within the Park.

Seven broad categories of landforms occur in the Park. These are glaciofluvial, eolian, morainal, glaciolacustrine, lacustrine, organic and open water. These categories can be combined into upland (sandy or non-sandy) or wetland Level 1 Landform classes. These categories with the exception of open water can be further subdivided on the basis of overall topographic expression, local relief, and depth and coarseness of parent material. Maps 2 and 3 depict the landforms at a scale of 1:5,000 for the respective western and eastern portions of the Dillberry Provincial Park project area.

8.1 Uplands

Sandy uplands are overlain with glaciofluvial and eolian deposits. Ice-contact glaciofluvial deposits are found primarily in the northern and western portion of the Park. Former glaciofluvial sands have been reworked by wind action to form the eolian dune landforms evident in the southern and eastern portion of the Park. The separation between glaciofluvial and eolian deposits runs roughly from the northeast corner of the Park, southwest through the centre of the northern shore of Long Lake. Vegetation associated with upland landforms is variable and reflects moisture conditions associated with slope angle, slope position and aspect. Other landforms associated with the sandy uplands are higher level lacustrine beach terraces around Killarney and Leane Lakes. Non sandy uplands are represented by small local areas of morainal and glaciolacustrine deposits south of Killarney Lake in the southwestern portion of the project area.

8.1.1 Glaciofluvial Landforms (GF)

The glaciofluvial landscape is represented by undulating to hummocky terrain marked by pothole lakes and slough filled depressions, resulting in a knob and kettle topographic expression. This glaciofluvial landscape has been further classified into the following landform types based on topography, local relief, and depth and coarseness of parent material.

GF1 is the most prominent glaciofluvial landform type within the Park. It represents undulating to hummocky uplands overlain by ice contact kame deposits composed of sand to gravelly sand. In a small area of higher terrain east of Ranger Lake along Highway 17 in the northern part of the Park, the kame deposits thin out and cover medium textured morainal material. Slopes in GF1 landform types range from 5 to 20%.

GF2 also consists of coarse sandy kame deposits and represents terrain comprised of moderate to steep slopes (8-65%). The ridges along the north shore of Long Lake are typical of this category. GF2 units have the steepest slopes compared to the other GF units.

GF3 defines the undulating to low relief glaciofluvial lowlands overlain with coarse sandy kame deposits. Slopes range from 0 to 10%. This class defines the low relief area in the northeastern portion of the project area east of Highway 17 and along the Park boundary, and lowlying areas east of Ranger Lake and Speedy Lake.

GF4 represents level to undulating terrain comprised of coarse gravelly deposits south of Killarney Lake in the western portion of the project area. Average slopes range from 0 to 15%.

All four glaciofluvial landform types are vegetated with similar woodland, tall and low shrubland, and grassland vegetation types and communities.

8.1.2 Eolian Landforms (E)

This parent material is very well defined on the landscape in the form of dunefields. It is the dominant parent material in the Park in terms of overall area. Three broad eolian landform types have been defined.

E1 represents undulating to ridged stabilized dunefields, which include occasional active dunes (blowouts), and higher relief hummocky and ridged uplands with more frequent active dunes. These areas are located south of Long Lake and along the eastern boundary of the Park. Slopes on average range from 3 to 45% with occasional slopes as high as 75% in active blowouts.

E2 represents subdued, moderate relief dunes with lower slopes than those present in E1. The eolian deposits can be deep or overlie coarse textured ice-contact glaciofluvial and medium textured morainal deposits as veneers and blankets. Drainage ranges from rapid on thick eolian sands to well drained on thin eolian material over morainal deposits. This landform is found in scattered areas south of Long Lake and as a small area in the extreme north-eastern corner of the Park.

E3 represents undulating to low relief hummocky sandy eolian deposits with occasional dune ridges, and tends to separate the higher E1 and E2 landform types. E3 units are generally the flatter portions of the Park. Signs of past cultivation are evident in E3 units from the presence of introduced non-native plant species and old field furrows. Cultivation appears to have had an affect on subduing the steepness and definition of natural slopes in this area.

All three glaciofluvial landform types are vegetated with similar woodland, tall and low shrubland and grassland vegetation types and communities.

8.1.3 Lacustrine Landform (L)

Lacustrine Landform L3 represents a sandy textured, level to gently undulating beach ridge. L3 is classed as an upland due to its overall slightly better drainage than adjacent lower level lacustrine classes (see L1 and L2 landform types in the Wetland section), and site conditions suited to the growth of wet balsam poplar woodlands and moist aspen woodlands which are not considered typical organic vegetation communities. Soils drainage classes in this landform type range from well to imperfectly drained.

8.1.4 Glaciolacustrine Landform (GL)

A small area of level to undulating medium textured glaciolacustrine veneers and blankets over medium textured morainal desposits (GL1) is evident adjacent to the M1 unit in the south-west part of the Park south of Killarney Lake. Slopes in this area range from 0 to 5%. This site is moderately well drained and vegetated by low and tall shrublands and woodlands.

8.1.5 Morainal Landform (M)

A small pocket of morainal material (M1) is evident in the most recently acquired area of the Park, south of Killarney Lake. This terrain unit represents a gently undulating morainal depression overlain by imperfectly drained saline, medium to fine textured morainal deposits. Grasslands grow on the M1 unit in the project area.

8.2 Wetlands

Wetlands in the Park occur around lakes and in pothole depressions. Lacustrine and organic deposits are commonly found in these areas.

8.2.1 Lacustrine Landforms (L)

Lacustrine landforms classed as wetland types, occur along the shorelines of the larger lakes in the Park, namely Dillberry, Long, Killarney, Leane, Speedy and Ranger Lakes. Shorelines are composed of sediments ranging in texture from coarse to fine which have been recently exposed as a result of receding water levels. Three wetland landforms representing lacustrine deposits have been identified, based on slope, local elevation and relief, and proximity to open water. The presence of gleyed soil subgroups and Gleysols indicates saturated moisture conditions associated with imperfect to very poor drainage related to the proximity of these landform units to open permanent water. Occasional Regosolic soils occur on drier, slightly raised portions of exposed beach sand terraces evident along the perimeter of major lakes.

L1 defines recently exposed coarse to fine textured lake bottom sediments located between open water and slightly raised outer perimeter beach terraces (L2). These areas have a level surface expression and occur in the basins of lakes such as Killarney, Leane and Ranger, which frequently experience draw down during drought periods. Drainage conditions are classed as poor. Exposed mudflats (often saline crusted in lakes such as Killarney and Leane) are a common L1 landform feature. Marshes and wet meadows are the dominant vegetation types associated with L1 areas.

L2 terrain represents level to gently undulating lower level beach terraces around the perimeter of lakes such as Killarney, Leane, Dillberry, Ranger and Speedy Lakes. This landform type is often slightly higher in local elevation than adjacent L1 terrain located near the center of the lake basin. L2 beach deposits are predominantly sandy and occasionally show signs of wind modification especially around perimeters of large lakes such as Killarney Lake. Drainage is predominantly poor to imperfect with occasional well drained sites located in small scattered areas of slightly higher terrain often adjacent to L3 beach terraces. L2 landforms are classed as wetlands because of the predominance of wet meadows and marshes - two typical wetland vegetation types. L2 also includes unvegetated lower beach terraces such as the sandy beach along the shoreline of Dillberry Lake.

An L4 landform occurs in a band around the shoreline of Long Lake. This unit represents an area of deep to shallow marshes consisting of emergent vegetation rooted to coarse to fine textured lacustrine sediments at or below the water line. Drainage is very poor.

8.2.2 Organic Landforms (N)

Organic fen deposits are found in non-saline to slightly saline pothole depressions that are drying up, and in lowlying areas adjacent to or along major lakes such as Dillberry Lake and Long Lake. Organic sites were sampled at the south end of Dillberry Lake, and northwest and southwest of the Park campground. These sites are generally level and are poorly to very poorly drained. Organic materials consist primarily of humic peat with occasional mesic and fibric accumulations. Often these organic deposits occur as veneers or blankets over local lacustrine deposits in pothole depressions. These sites are classed as N1. Additional N1 depressions are found in a small area south of Long Lake, in a low-lying area that extends north-west from Ranger Lake, and a small former pond in a peninsula that extends into Killarney Lake in the south-western portion of the Park.

N2 represents a unique area of humic organic deposits floating over water in the extreme eastern portion of Long Lake. The drainage is very poor with extensive areas of water at the surface and the associated vegetation type is a floating fen.

8.2.3 Open Water - Lakes and Ponds (OW)

Lakes and ponds (OW) make up the remainder of the wetlands in the Park. The most notable lakes with open water within the project area are Dillberry, Long, Speedy and Ranger Lakes (refer to Figure 1 for locations). These lakes vary in depths and water chemistry and are described in more detail along with Killarney and Leane Lakes in Section 13. Smaller ponds in pothole depressions are evident in the north-eastern portion of the Park.

9. SOILS

Dillberry Lake Provincial Park occurs within the Dark Brown Chernozemic soil zone of Alberta. Dark Brown Chernozems have diagnostic Ah horizons at least 10 cm thick with dry colour values from 3.5 to 4.5 and chromas greater than 1.5. These horizons are intermediate in color between the lighter Ah horizons of Brown Chernozems and the darker Ah horizons of Black Chernozems. Dark Brown soils develop in a semiarid climate under mesophytic native grasses and forbs (Canadian System of Soil Classification, 1998). Dark Brown Chernozems in the Park are typical on very rapidly to well drained upland sites underlain by glaciofluvial or eolian parent materials. Other soil orders prevalent in the Park are Regosols developed on disturbed uplands sites such as blowouts, and Gleysols and Organics in poorly drained to very poorly drained sites around large lakes and in pothole depressions. Soil classification and descriptions for the Park are based on Greenlee (1982), air photo interpretation and 1997 field investigations.

9.1 Upland Soils

Rapidly to very rapidly drained Orthic Dark Brown Chernozems are the most common soil subgroup on coarse textured upland glaciofluvial (gravelly sand to sand) and eolian (sand) parent materials in the Park. Occasional well drained Orthic Dark Brown Chernozems developed on sandy glaciofluvial veneers over medium textured morainal deposits occur on higher terrain in the northern and southern portions of the Park. Less well developed Rego Dark Brown Chernozems with Ah horizons over C and no intervening Bm horizon occur in association with Orthic Regosols in dune areas disturbed by recent wind erosion. Recently exposed, poorly vegetated blowouts are typical sites for rapidly to very rapidly drained Rego Dark Brown Chernozems and Orthic Regosols. A small area of imperfectly drained Gleyed Solonetzic Black Chernozems was observed on level to gently undulating medium textured till deposits south of Killarney Lake (M1 landform type). Soil salinity is high at this site as compared to the surrounding upland. This evident from a Bntjgj horizon developed below a chernozemic Ah in the soil profile.

9.2 Wetland Soils

Wetland areas in the Park often represent exposed lacustrine sediments along shorelines of lakes and small isolated depressions with impeded soil drainage. Soils developed in these locations fall within the Gleysolic and Organic soil orders. Poorly to very poorly drained Orthic and Rego Gleysols have developed on lacustrine sediments exposed along shorelines of lakes such as Dillberry, Leane, Killarney, Speedy and Ranger Lakes. Gleysols developed on exposed lake bottom material along Leane, Killarney and Ranger Lakes are further classed as having a saline phase due to the high salt content of the sediments. Gleysols located along Dillberry Lake have a noticeably lower saline content. Organic soils occur in small local depressions where conditions allow for the accumulations of mesic and humic organic deposits greater than 40 cm. The most common Organics are poorly drained Terric and Typic Humisols derived from heavily decomposed fen vegetation (e.g. sedges). Occasionally pockets of Mesisols and Fibrisols (Terric and Typic subgroups) may occur. Like the Gleysols, Organics soils observed throughout the Park can have saline and non-saline phases. A floating mat of organic material was examined at the east end of Long Lake. The soil here was a very poorly drained Hydric Humisol developed from brown mosses floating on water.

10. VEGETATION (LEVEL 2 VEGETATION TYPES AND LEVEL 3 VEGETATION COMMUNITIES)

Vegetation growth in the Park is influenced by landform and site factors such as aspect, slope, surface stability and moisture availability. The upland area consists primarily of terrain overlain by glaciofluvial sediments in the north and eolian sediments in the south. Parent materials consist primarily of rapidly pervious and rapidly to very rapidly drained sandy deposits. This rapid drainage along with the climatic pattern of the region results in xeric to submesic site conditions in most of the uplands. Submesotrophic conditions exist in the sandy uplands due to rapidly drainage and low nutrient and mineral holding capacity of the coarse parent material. Vegetative growth becomes more prolific in sites with higher moisture and nutrient levels. This moisture gradient pattern is readily apparent along lakeshores, especially along their southern perimeters where cooler more moist north-facing slope aspects are common. High moisture and available nutrient levels, and lush vegetation growth are also found in potholes.

Vegetation communities growing on upland sites are those which can withstand drier soil conditions and lower nutrient levels. A well-defined moisture gradient is less evident in the sand hills due to the lack of groundwater sources such as lakes and potholes. Moisture gradients in the sand hills are a result of slope aspect, slope gradient and slope position (e.g. north slopes generally slightly moister than south slopes; lower gentler slopes are slightly moister than upper steeper slopes).

The major vegetation types have been classified according to physiognomic structure of the dominant strata, and tend to reflect the moisture regimes associated broadly with landform and more specifically with slope and aspect. Vegetation communities (Level 3) within each vegetation type (Level 2) are presented in order of increasing site moisture availibility. Plant communities have been qualitatively assessed based on plant species present and existing site conditions. Communities are classified according to the dominant species within each physiognomic strata. Co-dominant species are indicated with a dash (-), and strata are separated with a forward slash (/). Those species occurring in brackets ( ) are an integral part of the community but only occur occasionally.

The number of field sample sites (investigated in the summer of 1997) representing a vegetation community is entered in brackets (e.g. n=6) following the community type name. Site information for each community is presented in order of frequency from highest to lowest. Superscript numbers (e.g. ^{2,4,5}) identify the number of sample sites possessing a specific site characteristic. No superscript numbers are given for communities represented by a single site. This representation provides the user an immediate insight to the prominent site characteristics associated with a community type. A list of plant species encountered at all the sample sites is provided in Appendix 4. It should be noted that this is not an exhaustive list of species occurring in the Park, only a listing of those species that were encountered at the field sample sites. Complete definitions of the site factors can be obtained from the Ecological Land Survey Site Description Manual (Alberta Environmental Protection, 1994b), and complete descriptions of the soil subgroups are found in the Canadian System of Soil Classification (Soil Classification Working Group, 1998).

Maps 4 and 5 enclosed in the back of this report display the Level 2 vegetation types for the respective western and eastern portions of the Dillberry Lake Provincial Park project area at a scale of 1:5,000 on an orthophoto mosaic base.

The primary separation between vegetation types within the Park is based on where they occur in the uplands or wetlands. The wetland classes are generally identified based on the parent material, moisture regime and vegetation present. Glaciofluvial and eolian landforms in upland areas have relatively homogeneous parent material textures and overall topography. This homogeneity is also evident in the relatively consistent upland vegetation patterns over these two dominant upland landform classes.

A number of disturbed areas (anthropogenic features) are located within the Park boundary. These features are centred aournd Dillberry Lake, which is considered having the greatest recreational potential of all the lakes in the Park and vicinity. A number of cottages are located along the southwest perimeter of the lake. Parks buildings (e.g. office, maintenance yard and storage) are located immediately west of the cottage development. A campground is situated north of the lake. Much of the sandy shoreline around Dillberry Lake in the Park is used for summer recreational activities such as swimming and sunbathing. Hiking trails are located in the north end of the Park around Speedy and Ranger Lakes. In the south, traces of an old road are apparent, however, much of the area is slowly reverting to a natural state. Two former Park staff residences occur south of Highway 17 in the southeast portion of the Park. The residences are no longer utilized by Parks staff.

10.1 Upland Vegetation Types

The upland vegetation pattern is defined on the basis on aspect and slope. Woodland and tall shrub vegetation types are prevalent on the generally moister north and north-east facing slopes. Eastern aspects tend to have a prominent cover of tall shrubs, while on the drier southern aspects, tall shrubs tend to occur in mid to lower slope positions. The most extreme growing conditions caused by increased temperature and decreased moisture availability, occur on southern aspects. Dwarf shrub mats are very common on steep, upper south-facing slopes, while grasslands tend to occur on upper south-facing slopes with lower slope angles. Shrubs and woodlands are frequently found in mid slope positions. On undulating terrain the difference in moisture conditions is less distinct and as a result the changes in vegetation patterns are more subtle. The vegetation pattern and associated moisture gradient is most distinct on steeply slope terrain (e.g. steep sand hills and slopes descending to lake basins).

10.1.1 Active Dunes (AD); Plate 1

Active dune sites or blowouts are areas which are currently affected by wind erosion. These sites are generally located on south to west facing aspects and are prevalent in the dune fields (E1). Active dunes or blowouts are scattered throughout the southern half of the Park. Continuous wind action and transport of sand prevents any soil development and available soil moisture and nutrients are low resulting in sparse plant growth. Blowouts are defined by a marked lack of vegetation on rapidly to very rapidly drained Orthic Regosols.

Sand Grass - Sand Dropseed - June Grass - Blunt Sedge (*Calamovilfa longifolia - Sporobolus cryptandrus - Koelaria macarntha - Carex obstusata*)

Community: Sand Grass-Sand Dropseed-June Grass-Blunt Sedge (n=3)

Sites: 25a, 34, 89
Slope: (10-15%), (31-45%), (46-70%)
Aspect: W, SW, E
Level 1 Landform: E1^{3}
Soil: O.R^{3}
Drainage: rapid^{2}, very rapidly
Moisture: very xeric^{2}, xeric
Nutrients: oligotrophic^{2}, submesotrophic

Common Species:

Dwarf Shrubs:	
creeping juniper	*Juniperus horizontalis*
Forbs:	
hairy golden aster	*Heterotheca villosa*
Graminoids:	
june grass	*Koelaria macrantha*
sand dropseed	*Sporobolus cryptandrus*
sand grass	*Calamovilfa longifolia*
blunt sedge	*Carex obtusata*

10.1.2 Grasslands (G)

Grasslands define those dry areas that have a predominant cover of various species of grass and dryland sedges and lack tree or shrub cover. The grasslands within the Park are relatively homogeneous in species and cover, and the prominent grasses are those typical of the Northern Fescue Grassland Subregion, which lies adjacent to the southern boundary of the Central Parkland Subregion. This vegetation type is associated with Chernozemic and Regosolic soils underlain by either coarse eolian or glaciolfluvial parent materials. Dwarf shrubs such as creeping juniper and bearberry are included in this vegetation type, since these woody species cannot be readily distinguished from grasslands on air photos due to the low resolution.

Grasslands are found on stabilized sand dunes, sandy plains, crests and the upper and middle positions of south to west facing slopes on glaciofluvial hummocks. These are sites where growing season temperatures and/or moisture deficits are high due to the combination of slope position and aspect. Dwarf shrub communities occur on the upper and mid slope positions of steeper (average slope = 12%, n=12) slopes while grassland communities are associated with shallower slopes (average slope = 7%, n=16). Grasslands are common on southern aspects but may also be prevalent on shallow slopes in all other aspects. Soils associated with this vegetation type range from well to very rapidly drained Orthic Regosols to Dark Brown Chernozems.

Several communities are associated with this vegetation type. The location of these communities is affected by slope and aspect in areas of consistent sandy glaciofluvial and eolian parent material. Much of the grasslands are homogeneous in terms of grass species present, however, communities can be further separated on the basis of the relative abundance of lichens and sedges. These characteristics are important when viewing and distinguishing the effect of moisture gradients upon the Park landscape. If the grasslands are viewed over a larger area of the Central Parkland, these differences may be considered insignificant and many of the communities may be combined. Dominant grass species include western porcupine grass (*Stipa curtiseta*), June grass (*Koeleria macrantha*), slender wheat grass (*Agropyron trachycaulum*), and needle and thread grass (*Stipa comata*).

Small patches of prickly pear cactus (*Opuntia* spp.) occur scattered throughout these sites growing in small sparsely vegetated microsites. Very xeric sites, particularly in the dune fields may contain a prominent cover of lichen. A prominent forb component is also present in some grassland communities. On many of the south to south-west facing slopes there is an abundance of hardy forbs such as golden bean (*Thermopsis rhombifolia*), pasture sagewort (*Artemesia frigida*), plains wormwood (*Artemesia campestris*) and prairie sagewort (*Artemesia ludoviciana*).

10.1.2.1 Dwarf Shrub Communities

These communities have a prominence of prostrate evergreen shrubs, which can withstand the extreme growing conditions (xeric site conditions and low nutrient levels) on steep south-facing aspects. The mat-like growth pattern of these shrubs stabilizes the loose, sandy deposits on these steep slopes. Dark Brown Chernozems are the dominant soils underlying this vegetation type.

Creeping Juniper (*Juniperus horizontalis*); Plate 2

Creeping juniper communities are frequently found on the upper portions of steep south facing slopes and occasionally on north and east aspects that have shallower slopes. This community grows on both glaciofluvial and eolian landforms in the Park. Rapidly to well drained Orthic Dark Brown Chernozems are the most common soils in this community. However, on steeper slopes, very rapidly to rapidly drained Orthic Regosols are the dominant soils. Sites 30 and 32 had 20 and 15% covers of lichen respectively.

Community: Creeping Juniper (n=11)
Sites: 5, 21, 28, 30, 32, 36, 65, 67, 71, 77, 78
Slope: (10-15%)^5, (2-5%)^2, (16-30)^2, (6-9%)^2
Aspect: E^4, S^3, SW^3, NW
Level 1 Landform: GF1^4, E1^3, E2^2, E3, GF3
Soil: O.DB^8, O.R^3
Drainage: rapid^8, well^2, very rapid
Moisture: xeric^{11}
Nutrients: submesotrophic^{11}

Common Species:

Dwarf Shrubs:	
creeping juniper	*Juniperus horizontalis*
Forbs:	
hairy golden aster	*Heterotheca villosa*
golden bean	*Thermopsis rhombifolia*
bastard toadflax	*Comandra umbellata*
low goldenrod	*Solidago missouriensis*
purple prairie-clover	*Petalostemon purpureum*
pasture sagewort	*Artemisia frigida*
prairie sagewort	*Artemisia ludoviciana*
skeletonweed	*Lygodesmia juncea*
common scouring-rush	*Equisetum hyemale*
late yellow locoweed	*Oxytropis monticola*
Graminoids:	
western porcupine grass	*Stipa curtiseta*
needle and thread	*Stipa comata*
slender wheat grass	*Agropyron trachycaulum*
plains rough fescue	*Festuca hallii*
Rocky Mountain fescue	*Festuca saximontana*
sand grass	*Calamovilfa longifolia*
hay sedge	*Carex siccata*
blunt sedge	*Carex obtusata*
Lichens:	
reindeer lichen	*Cladina mitis*

Common Bearberry (*Arctostaphylos uva-ursi*)

One site dominated by bearberry was sampled. This site was located on some flats in the sandy upland plains (E3). Very little soil formation was evident. Forbs comprised a higher cover of vegetation than grasses.

Community: Common Bearberry (n=1)

Sites:	12
Slope:	(2-5%)
Aspect:	S
Level 1 Landform:	E3
Soil:	O.R
Drainage:	rapid
Moisture:	xeric
Nutrients:	submesotrophic

Common Species:

Dwarf Shrubs:		
	common bearberry	*Arctostaphylos uva-ursi*
	creeping juniper	*Juniperus horizontalis*
Forbs:		
	hairy golden aster	*Heterotheca villosa*
	low goldenrod	*Solidago missouriensis*
	pasture sagewort	*Artemisia frigida*
	plains wormwood	*Artemisia campestris*
Graminoids:		
	sand grass	*Callamovilfa longifolia*
	northern wheat grass	*Agropyron dasystachyum*
	slender wheat grass	*Agropyron trachycaulum*
	June grass	*Koeleria macrantha*

10.1.2.2 Grassland Communities

Grassland communities in the study area are primarily vegetated by grass species and occasional forbs, and lack trees or shrubs. Variations in species composition correspond to disturbance and differences in site moisture regime. These observed variations in species composition were used as the basis to distinguish the following communities.

Grassland communities generally possess Orthic Dark Brown Chernozemic soils with occasional Rego Dark Brown Chernozems and Orthic Regosols. Soil drainage for all soil subgroups ranges from very rapid to well. Blunt sedge appears to be most prevalent in grasslands developed on glaciofluvial sands and gravelly sands located in the northern part of the Park. Reindeer lichen is found in association with the drier grasslands growing in the dune fields. The grasslands overlying eolian parent materials tend to be slightly drier, and have lower total vegetation covers than those developed on glaciofluvial materials. Overall forb diversity and cover is very low in grassland communities.

Western Porcupine Grass - June Grass - Slender Wheat Grass / Reindeer Lichen (*Stipa curtiseta - Koeleria macrantha - Agropyron trachycaulum / Cladina mitis*)

This community is associated with the shallow south facing slopes of the generally flatter terrain in the midst of dune fields and adjacent transitional areas. The extreme lack of moisture in these relatively flat exposed eolian deposits inhibits soil formation and plant growth. Lichen cover at these sites ranged from 50 to 90% (average =72%). Grass cover ranged from 6 to 25% which is inversely proportional to lichen cover. Western porcupine grass (*Stipa curtiseta*), June grass (*Koeleria macrantha)* and slender wheat grass (*Agropyron trachycaulum*) were present at all sites. Plains rough fescue (*Festuca hallii*) and Hooker's oat grass (*Heliotrichon hookeri*) were dominant at site 9, while sand grass (*Calamovilfa longifolia*) was an important graminoid component at Site 4. Forb cover was very limited and only traces of a number of forb species were present at all three sites. Low covers (1-5%) of bearberry, creeping juniper and buckbrush were also present at these sites.

Community: Western Porcupine Grass - June Grass - Slender Wheat Grass / Reindeer Lichen (n=3)

Sites:	4a, 9, 13
Slope:	(2-5%)^{3}
Aspect:	S^{2},SE
Level 1 Landform:	E1^{2}, E3
Soil:	O.R^{2}, O.DB
Drainage:	rapid^{3}
Moisture:	xeric^{2}, subxeric
Nutrients:	submesotrophic^{3}

Common Species:

Shrubs:		
	buckbrush	*Symphoricarpos occidentalis*
Dwarf Shrubs:		
	bearberry	*Arctostaphylos uva-ursi*
	creeping juniper	*Juniperus horizontalis*
Forbs:		
	pasture sagewort	*Artemisia frigida*
	prairie sagewort	*Artemisia ludoviciana*
	plains wormwood	*Artemisia campestris*
	low goldenrod	*Solidago missouriensis*
	hairy golden aster	*Heterotheca voillosa*
	white evening-primrose	*Oenothera nuttallii*
	gaillardia	*Gaillardia aristata*
	Richardson's alumroot	*Heuchera richardsonii*
Graminoids:		
	western porcupine grass	*Stipa curtiseta*
	June grass	*Koeleria macrantha*

plains rough fescue	*Festuca hallii*
sand grass	*Calamovilfa longifolia*
slender wheat grass	*Agropyron trachycaulum*
Lichens:	
reindeer lichen	*Cladina mitis*

Pasture Sagewort / June Grass - Blunt Sedge (*Artemisia frigida / Koelaria macrantha - Carex obtusata*)

This community is common on upper south facing glaciofluvial slopes. These sites have more stable surface sediments than sites underlain by eolian deposits. Two sites were sampled. One was located in the northwest corner of the Park in the vicinity of Ranger Lake where hummocky uplands occur overlain by coarse gravelly kame deposits. The other site adjacent to a gravel pit south of Killarney Lake was situated on coarse gravelly glaciofluvial deposits. This community type is typical on the upper south facing slopes of these gravelly deposits. Xeric to very xeric moisture conditions exist on these rapidly to very rapidly drained south-facing slopes. Orthic and Rego Dark Brown Chernozemic soils are dominant in these areas. The latter soil subgroup occurs in areas, which have been disturbed in the recent past. Low covers (0-5%) of buckbrush (*Symphoricarpos occidentalis*) were present at these sites. Pasture sagewort (*Artemisia frigida*), June grass (*Koeleria macrantha*) and blunt sedge (*Carex obtusata*) were very prominent at both of these sites.

Community: Pasture Sagewort/June Grass - Blunt Sedge (n=2)
Sites: 37, 66
Slope: (2-5%), (16-30%)
Aspect: SW, W
Level 1 Landform: GF2, GF4
Soil: O.DB, R.DB
Drainage: very rapid, rapid
Moisture: very xeric, xeric
Nutrients: submesotrophic[2]

Common Species:

Shrubs:	
buckbrush	*Symphoricarpos occidentalis*
Forbs:	
hairy golden aster	*Heterotheca villosa*
golden bean	*Thermopsis rhombifolia*
pasture sagewort	*Artemisia frigida*
skeletonweed	*Lygodesmia juncea*
milk vetch	*Astragalus* spp.
Graminoids:	
slender wheat grass	*Agropyron trachycaulum*
June grass	*Koeleria macrantha*
western wheat grass	*Agropyron smithii*
blunt sedge	*Carex obtusata*
hay sedge	*Carex siccata*

Needle Grass - June Grass - Wheat Grass (*Stipa spp. - Koeleria macrantha - Agropyron* spp.)

This plant community is common in sites located in areas of stabilized eolian and glaciofluvial terrain exhibiting minimal erosion. Moisture and soil nutrient availability is higher at these sites. Soils are predominantly rapidly drained Orthic Dark Brown Chernozems. There is a greater diversity of grass and forb species compared to the two previously described grassland communities.

Community: Needle Grass - June Grass - Wheat Grass (n=3)

Sites:	1, 22, 29
Slope:	(2-5%)^{2}, (10-15%)
Aspect:	S^{2}, SW
Level 1 Landform:	E3, E2, E1
Soil:	O.DB^{3}
Drainage:	rapid^{3}
Moisture:	subxeric^{3}
Nutrients:	submesotrophic^{3}

Common Species:

Forbs:

low goldenrod	*Solidago missouriensis*
golden bean	*Thermopsis rhombifolia*
Richardson's alumroot	*Heuchera richardsonii*
pasture sagewort	*Artemisia frigida*
prairie sagewort	*Artemisia ludoviciana*
bastard toadflax	*Comandra umbellata*
harebell	*Campanula rotundifolia*
purple rock cress	*Arabis divaricarpa*

Graminoids:

sand grass	*Calamovilfa longifolia*
slender wheat grass	*Agropyron trachycaulum*
western wheat grass	*Agropyron smithii*
June grass	*Koeleria macrantha*
western porcupine grass	*Stipa curtiseta*
needle and thread	*Stipa comata*

Needle and Thread Grass - June Grass - Slender Wheat Grass - Blunt Sedge (*Stipa comata - Koeleria macrantha - Agropyron trachycaulum - Carex obtusata*)

This community is common on south-facing slopes and flat upland areas in the hummocky glaciofluvial terrain located in the north end of the Park. The prominence of blunt sedge (*Carex obtusata*) distinguishes this community from similar communities occurring on eolian deposits in the south. Forb species present are typical to those encountered in the other grassland types.

Community: Needle and Thread Grass - June Grass - Slender Wheat Grass - Blunt Sedge (n=5)

Sites: 44, 46, 48, 54, 55
Slope: (2-5%)^{2}, (10-15%)^{2}, (6-9%),
Aspect: S^{2}, SW^{2}, N
Level 1 Landform: GF1^{5}
Soil: O.DB^{5}
Drainage: rapid^{5}
Moisture: xeric^{5}
Nutrients: submesotrophic^{5}

Common Species:

Forbs:	
pasture sage	*Artemisia frigida*
purple prairie-clover	*Petalostemon purpureum*
Richardson's alumroot	*Heuchera richardsonii*
skeletonweed	*Lygodesmia juncea*
Graminoids:	
sand grass	*Calamovilfa longifolia*
slender wheat grass	*Agropyron trachycaulum*
western wheatgrass	*Agropyron smithii*
June grass	*Koeleria macrantha*
needle and thread	*Stipa comata*
Sandberg bluegrass	*Poa sandbergii*
plains rough fescue	*Festuca hallii*
blunt sedge	*Carex obtusata*

Crested Wheat Grass - Western Wheat Grass (*Agropyron pectiniforme - Agropyron smithii*) Disturbance Community; Plate 3

The presence of a very consistent cover of introduced grass species suggests that these sites were cultivated at some time prior to Park annexation. Old furrows evident on the terrain surface support this observation. This community is located on a level to gently undulating sandy plain which would have been easier to cultivate than the adjacent higher relief terrain. Typical soils developed on these sites are well to rapidly drained Orthic Dark Brown Chernozems. The two prominent species in this community are crested wheat grass (*Agropyron pectiniforme*) and western wheat grass (*Agropyron smithii*).

Community: Crested Wheat Grass - Western Wheat Grass (n=2)
Sites: 17, 19
Slope: (6-9%), (10-15%)
Aspect: N, W
Level 1 Landform: E3^{2}
Soil: O.DB^{2}
Drainage: rapid, well
Moisture: subxeric^{2}
Nutrients: submesotrophic^{2}

Common Species:

Forbs:	
harebell	*Campanula rotundifolia*
prairie sagewort	*Artemisia ludoviciana*
plains wormwood	*Artemisia campestris*
low goldenrod	*Solidago missouriensis*
Graminoids:	
western porcupine grass	*Stipa curtiseta*
western wheat grass	*Agropyron smithii*
crested wheat grass	*Agropyron pectiniforme*
sand grass	*Calamovilfa longifolia*
June grass	*Koeleria macrantha*

Needle Grass - Sandberg Bluegrass - Blunt Sedge (*Stipa* spp. - *Poa sandbergii* - *Carex obtusata*)

A single site located in a morainal depression south-west of the Killarney Lake was sampled. From all indications of site conditions and vegetation present during the field season, this site appeared to possess a dry, subxeric moisture regime. However, the slight depressional location and clay loam to clay textured morainal parent material has created imperfect drainage and subhygric moisture conditions. The imperfectly drained Gleyed Solonetzic Black Chernozem observed at the site reflects the impeded drainage and higher moisture holding capacity of the soil. The current vegetation however, does not reflect such moist conditions. The presence of gumweed indicates the existence of saline conditions.

Community: Needle Grass - Sandberg Bluegrass - Blunt Bedge (n=1)

Sites: 43
Slope: (2-5%)
Aspect: S
Level 1 Landform: M1
Soil: GLSZ.BL
Drainage: imperfect
Moisture: subhygric
Nutrients: mesotrophic

Common Species:

Forbs:	
gumweed	*Grindella squarrosa*
common yarrow	*Achillea millefolium*
small-leaved everlasting	*Antennaria parviflora*
milk vetch	*Astragalus* spp.
Long-fruited anemone	*Anemone cylindrical*
Graminoids:	
Sandberg's bluegrass	*Poa sandbergii*

green needle grass	*Stipa viridula*
smooth brome	*Bromus inermis*
blunt sedge	*Carex obtusata*
June grass	*Koeleria macrantha*
western porcupine grass	*Stipa curtiseta*

10.1.3 Shrublands

Shrublands have been classified into a number of vegetation types based on the physiognomic structure of the species present. Shrublands lack a tree overstory and possess total shrub covers equal or greater than 10%. Low shrubs are less than 1.0 meter in height. Typical low shrubs found the Park include buckbrush (*Symphoricarpus occidentalis*), rose (*Rosa* spp.), wild red raspberry (*Rubus idaeus*), aspen shrub (*Populus tremuloides*) and silverberry (*Eleagnus commuta*). Tall shrubs are greater than 1.0 meter in height and include saskatoon (*Amelanchier alnifolia*), choke cherry (*Prunus virginiana*), pin cherry (*Prunus pensylvanica*), willow (*Salix* spp.) and red-osier dogwood (*Cornus stolonifera*). Shrublands occur in a variety of moisture regimes. The presence of specific shrub communities is often determined by subtle variations in soil moisture which are a result local slope and aspect conditions.

10.1.3.1 Low Shrubland Communities (LS)

Low shrublands often occur in association with grasslands in the Park, however, they are not exclusive to this vegetation type. Low shrubland communities are typical on all slope aspects located on upper to mid-slope positions. Moisture conditions are xeric to subxeric on these slope positions. Very subtle changes in topography result in slight variations in site conditions, which in turn influence the type of shrub communities that grow there. Dark Brown Chernozems are the characteristic soils associated with these communities.

Buckbrush (*Symphoricarpus occidentalis*)

This community prefers slightly drier conditions than the other low shrub communities. Dominant soils are rapidly drained Orthic and Rego Dark Brown Chernozemic soils underlain by glaciofluvial and eolian deposits. This community is typical throughout the Park. Buckbrush communities are often observed amongst the grasslands and along the perimeters of naturally open woodlands.

Community: Buckbrush (n=2)

Sites:	39, 73
Slope:	(2-5%)^2
Aspect:	NE, SW
Level 1 Landform:	GF1, GF3
Soil:	O.DB, R.DB

Drainage: rapid[2]
Moisture: xeric[2]
Nutrients: submesotrophic[2]

Common Species:

Low Shrubs:	
buckbrush	*Symphoricarpus occidentalis*
silverberry	*Eleagnus commutata* (prominent at site 73)
prickly rose	*Rosa acicularis*
choke cherry	*Prunus virginiana*
Forbs:	
pasture sagewort	*Artemisia frigida*
low goldenrod	*Solidago missouriensis*
Graminoids:	
June grass	*Koeleria macrantha*
plains rough fescue	*Festuca hallii*(prominent at site 39)
hay sedge	*Carex siccata* (prominent at site 73)

Aspen Shrub / Creeping Juniper (*Populus tremuloides / Juniperus horizontalis*)

The one site observed was located on a shallow south-facing slope adjacent to the Park campground. Conditions were very dry and this was reflected in the low diversity of plant species. Traces of grasses and forbs invading from the surrounding grassland areas were observed at this site. Dry sedges were the dominant herbaceous species present.

Community: Aspen Shrub / Creeping juniper (n=1)
Sites: 75
Slope: (6-9%)
Aspect S
Parent Material: GF3
Soil: O.DB
Drainage: rapid
Moisture: xeric
Nutrients: submesotrophic

Common Species:

Low Shrubs:	
aspen	*Populus tremuloides*
Dwarf Shrubs:	
creeping juniper	*Juniperus horizontalis*
Forbs:	
low goldenrod	*Solidago missouriensis*
Graminoids:	
sand grass	*Calamovilfa longifolia*
blunt sedge	*Carex obtusata*
hay sedge	*Carex siccata*
Lichens:	
reindeer lichen	*Cladina mitis*

Silverberry (*Elaeagnus commutata*)

Silverberry communities are the predominant low shrub community on coarse glaciofluvial deposits in the northern part of the Parkand, and in shrubby meadows around the perimeter of saline lakes. Around lake edges, silverberry occurs in a band of shrubby meadow adjacent to marshes or graminoid meadows. This species occurs in more moist areas such as lacustrine basins and shallow hollows in undulating, glaciofluvial terrrain. Silverberry shrublands are commonly found in micro depressions which act as snow catchment areas, and in drainage tracts where moisture accumulates from spring runoff and summer rains. This species is also associated with drier meadows found on the beach ridges surrounding Killarney Lake. The moisture and nutrient levels at these beach ridge sites are influenced by terrain slopes and distance from moisture source.

The Silverberry Shrubland community grows on submesotrophic sites. Typical soils are rapidly drained Orthic Dark Brown Chernozems. In contrast, Silverberry Meadow sites are moister and more nutrient rich. Predominant soils at these meadow sites are Orthic and Gleyed Regosols. These moister meadow sites display a greater diversity of native plant species. The proximity of the meadow sites to saline water bodies is evident in the presence of a number of halophytic or salt tolerant plant species.

Community: Silverberry Shrubland (n=1)

Sites:	69
Slope:	(6-9%)
Aspect:	SW
Level 1 Landform:	GF1
Soil:	O.DB
Drainage:	rapid
Moisture:	subxeric
Nutrients:	submesotrophic

Common Species:

Low Shrubs:

silverberry	*Elaeagnus commutata*
buckbrush	*Symphoricarpos occidentalis*
prickly rose	*Rosa acicularis*

Graminoids:

sedge species	*Carex* spp.
sand grass	*Calamovilfa longifolia*
slender wheat grass	*Agropyron trachycaulum*

Community: Silverberry Meadow (n=2)

Sites:	41, 81
Slope:	(2-5%), (6-9%)
Aspect:	N, SE

Level 1 Landform: $L2^2$
Soil: O.R, GL.R
Drainage: rapid, imperfect
Moisture: subxeric, subhygric
Nutrients: submesotrophic, mesotrophic

Common Species:

Low Shrubs:	
silverberry	*Elaeagnus commutata*
common wild rose	*Rosa woodsii*
Forbs:	
long-stalked chickweed	*Stellaria longipes*
tufted white prairie aster	*Aster ericoides*
wild licorice	*Glycyrrhiza lepidota*
Canada goldenrod	*Solidago canadensis*
narrow-leaved hawkweed	*Hieracium umbellatum*
Graminoids:	
slender wheat grass	*Agropyron trachycaulum*
wire rush	*Juncus balticus*
June grass	*Koeleria macrantha*
salt grass	*Distichlis stricta*
alkali cord grass	*Spartina gracilis*
sand grass	*Calamovilfa longifolia*
slender wheat grass	*Agropyron trachycaulum*

Rose (*Rosa* spp.)

Only one rose community was sampled. This site was located on a subxeric, west facing slope on sandy peninsula extending into the south end of Killarney Lake. Rose communities tend to prefer moister conditions than Buckbrush communities.

Community: Rose (n=1)

Sites: 47
Slope: (10-15%)
Aspect: W
Level 1 Landform: GF1
Soil: R.DB
Drainage: rapid
Moisture: subxeric
Nutrients: submesotrophic

Common Species:

Low Shrubs:	
prickly rose	*Rosa acicularis*
saskatoon	*Amelanchier alnifolia*
choke cherry	*Prunus virginiana*
Forbs:	
goldenrod	*Solidago* spp.
hairy golden aster	*Heterotheca villosa*

northern bedstraw	*Galium boreale*
bastard toadflax	*Comandra umbellate*
Graminoids:	
wheat grasses	*Agropyron* spp.
bluegrass	*Poa* spp.
blunt sedge	*Carex obtusata*

10.1.3.2 Tall Shrubland Communities (TS)

Tall shrubs are often found in association with young aspen. This vegetation type occurs on all slope aspects but is most common on upper and mid slope positions of north to east-facing slopes and the middle position of south-facing slopes. Species diversity and cover tends to increase as moisture levels increase.

Aspen Shrub / Creeping Juniper / Reindeer Lichen (*Populus tremuloides / Juniperus horizontalis / Cladina mitis*)

This community is common on mid to upper positions of shallow south-facing slopes on both eolian and glaciofluvial terrain. Both creeping juniper (*Juniperus horizontalis*) and reindeer lichen (*Cladina mitis*) are able to thrive in the xeric conditions prevalent at these sites. Aspen growth is often stunted in these areas. A variety of grass species invading from the surrounding grasslands are found in this community. Forb species diversity and cover is very low.

Community: Aspen Shrub / Creeping Juniper / Reindeer Lichen (n=2)

Sites: 11, 58
Slope: (2-5%), (6-9%)
Aspect: S^2
Level 1 Landform: E3, GF1
Soil: O.DB^2
Drainage: rapid^2
Moisture: xeric, subxeric
Nutrients: submesotrophic^2

Common Species:

Tall Shrubs:	
aspen	*Populus tremuloides*
Low Shrubs:	
rose	*Rosa* spp.
Dwarf Shrubs:	
creeping juniper	*Juniperus horizontalis* (prominent at site 58)
Forbs:	
northern bedstraw	*Galium boreale*
plains wormwood	*Artemisia campestris*
prairie sagewort	*Artemisia ludoviciana*

Graminoids:	
slender wheat grass	*Agropyron trachycaulum*
western porcupine grass	*Stipa curtiseta*
purple oat grass	*Schizachne purpurascens*
hay sedge	*Carex siccata*
Lichens:	
reindeer lichen	*Cladina mitis*

Aspen Shrub - Saskatoon - Choke Cherry / Buckbrush (*Populus tremuloides - Amelanchier alnifolia - Prunus virginiana / Symphoricarpos occidentalis*)

This tall shrub community is common on dry upper north-facing slopes, but may occur on south facing glaciofluvial and eolian terrain slopes. Soils typical of this community are rapidly drained Orthic Dark Brown Chernozems. Some sites possess a low cover (<5%) of rose. Site 8 appears to be somewhat transitional between the tall shrub Buckbrush and tall shrub Rose communities. However, many of its site conditions are more characterisitic of the Buckbrush community.

Community: Aspen Shrub - Saskatoon - Choke Cherry / Buckbrush (n=7)

Sites: 8, 15, 27, 31, 70, 72, 86
Slope: (2-5%), (6-9%)^3, (16-30%)^2, (10-15%)
Aspect: N^4, SE^2,S
Level 1 Landform: E2^4, E1, GF1, GF2
Soil: O.DB^6, O.R
Drainage: rapid^7
Moisture: subxeric^6, xeric
Nutrients: submesotrophic^7

Common Species:

Tall Shrubs:	
aspen	*Populus tremuloides*
saskatoon	*Amelanchier alnifolia*
choke cherry	*Prunus virginiana*
Low Shrubs:	
buckbrush	*Symphoricarpos occidentalis*
snowberry	*Symphoricarpos albus*
rose	*Rosa* spp.
twining honeysuckle	*Lonicera dioica*
Forbs:	
spreading dogbane	*Apocynum androsaemifolium* (prominent at site 70)
cream-colored vetchling	*Lathyrus ochroleucus*
northern bedstraw	*Galium boreale*
star-flowered Solomon's seal	*Smilacina stellata*
Graminoids:	
wheat grasses	*Agropyron* spp.
Purple oat grass	*Schizachne purpurascens*
white-grained mountain rice grass	*Oryzopsis asperifolia*

Aspen Shrub - Saskatoon - Choke Cherry / Rose (*Populus tremuloides - Amelanchier alnifolia - Prunus virgiana / Rose* spp.)

This community has a high diversity of plant species and is most common on steeper north aspects where moisture and nutrient levels are high. Species indicative of this richness in site conditions are northern gooseberry (*Ribes oxycanthoides*) and wild red raspberry (*Rubus idaeus*). Soils tend to be less well developed with rapidly drained Rego Dark Brown Chernozems, Orthic Regosols and Cumulic Regosols the dominant subgroups.

Community: Aspen Shrub - Saskatoon - Choke Cherry / Rose (n=3)

Sites:	20, 26, 42
Slope:	(31-45%), (46-70%)^2
Aspect:	NE^2, NW
Level 1 Landform:	E1^2, GF1
Soil:	O.R, CU.R, R.DB
Drainage:	rapid^3
Moisture:	submesic^3
Nutrients:	submesotrophic^2, mesotrophic

Common Species:

Tall Shrubs:	
aspen	*Populus tremuloides*
saskatoon	*Amelanchier alnifolia*
choke cherry	*Prunus virginiana*
Low Shrubs:	
common wild rose	*Rosa woodsii*
prickly rose	*Rosa acicularis*
wild red raspberry	*Rubus idaeus*
northern gooseberry	*Ribes oxycanthoides*
snowberry	*Symphoricarpos albus*
Forbs:	
wild sarsaparilla	*Aralia nudicaulis*
star-flowered Solomon's seal	*Smilacina stellata*
Canada goldenrod	*Solidago canadensis*
veiny meadow rue	*Thalictrum venulosum*
northern bedstraw	*Galium boreale*
common fireweed	*Epilobium angustifolium*
fairybells	*Disporum trachycarpum*
Graminoids:	
purple oat grass	*Schizachne purpurascens*
Sprengel's sedge	*Carex sprengelii*

Caragana / Smooth Brome (Disturbance Community) (*Caragana arborescens / Bromus inermis*)

This community occurs in an old abandoned, homestead south of Killarney Lake.

Caragana was often planted as a windrow shrub due to its hardiness, and rapid and dense growth. The thick, dense cover of caragana inhibits the growth of native plant species.

Community: Caragana-Smooth Brome (n=1)

Sites:	79
Slope:	(10-15%)
Aspect:	N
Parent Material:	GF1
Soil:	O.DB
Drainage:	well
Moisture:	submesic
Nutrients:	permesotrophic

Common Species:

Tall Shrubs:	
caragana	*Caragana arborescens*
saskatoon	*Amelanchier alnifolia*
choke cherry	*Prunus virginiana*
Graminoids:	
smooth brome	*Bromus inermis*

10.1.4 Woodlands (W)

Woodlands represent stands were tree heights are higher than 5 meters and canopy closures are 6% or greater (Nesby, 1997). Woodlands in the Park tend to occur in areas with higher moisture levels compared to grasslands. Tree cover values are highly variable. Stand condition and cover tends to be related to moisture availability. Aspen grows primarily on the sandy uplands, while balsam poplar is found adjacent to wetlands, particularly along lakeshores. Canopy cover in sites surrounding wetlands is generally much denser, and the understory vegetation cover is taller and considerably more diverse, due to the higher moisture and nutrient levels. The effect of lower moisture levels becomes most apparent in uplands located further away from the wetlands. Tree growth in woodlands on these uplands sites is often stunted.

Graminoid cover tends to decrease while forb cover increases in the woodlands. A change in the graminoid species present is also apparent. Aside from invaders from the nearby grasslands, purple oat grass (*Schizachne purpurescens*) and Sprengel's sedge (*Carex sprengelii*) are often present in trace amounts. As with the tall shrub communities, a distinct moisture pattern is apparent in the woodland communities and is often reflected by the presence of low shrubs. Creeping juniper (*Juniperus horizontalis*) is typical of those sites with dry and generally nutrient poor conditions. The following low shrubs are found along a low to high moisture gradient: buckbrush in dry sites, rose - buckbrush on slightly moister sites, rose with traces of raspbery in more mesic sites and rose - raspberry in moist and nutrient rich sites.

10.1.4.1 Aspen Woodland Communities

Aspen woodlands occur on dry, sandy upland glaciofluvial and eolian deposits. Occasionally these communities are located on wetter and richer glaciolacustrine and lacustrine deposits. Well to very rapidly drained Orthic Dark Brown soils are the most common soil subgroup associated with this vegetation type. Aspect and slope position are very important factors in determining the location of these upland aspen woodland communities. Aspen woodlands are most prominent on the generally moister and cooler north aspects, however, dry aspen communities may occur on mid to lower slope positions of shallower south facing slopes.

There is a noticeable decrease in the vigor of aspen stands growing on the stabilized dunefields (E1). The increased stress to plant growth caused by severe moisture deficits due to low precipitation, high evaporation rates and low moisture holding capacity of the soil is evident in the stunted growth habit of the trees and the high levels of stand break up.

Aspen / Aspen Shrub - Choke Cherry - Saskatoon / Creeping Juniper - Common Bearberry (*Populus tremuloides / Populus tremuloides - Prunus virgiana - Amelanchier alnifolia / Juniperus horizontalis - Arctostaphylos uva-ursi*); Plate 4

This community is prevalent on subxeric sites located on upland eolian and glaciofluvial parent materials. Creeping juniper (*Juniperus horizontalis*) and bearberry (*Arctostaphylos uva-ursi*) cover ranges from 15 to 60% (average = 38%), while the tall shrub cover ranges from 25 to 45% (average = 33%). This woodland community has significantly greater species diversity than the tall shrub / juniper community. Soils in this community tend to be the least well developed of all the woodland communities and range from rapidly drained Rego Dark Brown to Orthic Dark Brown Chernozems. This community is not confined to any particular aspect. The most typical sites are very exposed upper slopes and toe positions where little or no moisture accumulates. Site 2 contains a number of invading grassland species. Site 59 appears to be a transition between woodland communities with a tall shrub / creeping juniper understory and a tall shrub / buckbrush understory.

Community: Aspen / Aspen Shrub - Choke Cherry - Saskatoon / Juniper - Common Bearberry (n=3)

Sites:	59, 87, 90
Slope:	(6-9%)^2, (10-15%)
Aspect:	NE, S, E
Level 1 Landform:	E1, E3, GF1
Soil:	R.DB^2, O.DB
Drainage:	rapid^3
Moisture:	subxeric^3
Nutrients:	submesotrophic^3

Common Species:

Trees:	
aspen	*Populus tremuloides*
Tall Shrubs:	
aspen	*Populus tremuloides*
saskatoon	*Amelanchier alnifolia*
choke cherry	*Prunus virginiana*
Low Shrubs:	
snowberry	*Symphoricarpos albus*
Dwarf shrubs:	
creeping juniper	*Juniperus horizontalis*
ground juniper	*Juniperus communis*
common bearberry	*Arctostaphylos uva-ursi*
Forbs:	
veiny meadow rue	*Thalictrum venulosum*
harebell	*Campanula rotundifolia*
cream-colored pea vine	*Lathyrus ochroleucus*
prairie sagewort	*Artemisia ludoviciana*
low goldenrod	*Solidago missouriensis*
plains wormwood	*Artemisia campestris*
northern bedstraw	*Galium boreale*
Graminoids:	
purple oat grass	*Schizachne purpurascens*
hay sedge	*Carex siccata*

Aspen / Aspen Shrub - Saskatoon - Choke Cherry / Buckbrush (*Populus tremuloides / Populus tremuloides - Amelanchier alnifolia - Prunus virginiana / Symphoricarpos occidentalis*)

This community is typical on subxeric to submesotrophic mid slope positions on the southern aspects of upland glaciofluvial and eolian deposits. The rapidly drained Orthic Dark Brown Chernozemic soils tend to be more stable and better developed than the soils discussed in the previous community. This community may also appear on the stable upper slopes in the dune fields. Traces of both juniper and/or rose may be present and a compliment of forb and graminoid species similar to the previous woodland community may also be evident. Site 83 has extensive growth of snowberry and appears to be transitional to the woodland Rose community.

Community: Aspen / Aspen Shrub - Saskatoon - Choke Cherry / Buckbrush (n=4)

Sites: 62, 68, 83, 2
Slope: (10-15%)^2, (2-5%), (6-9%),
Aspect: SE^2 ,SW, S
Level 1 Landform: E1^2,GF2, GF3
Soil: O.DB^4
Drainage: rapid^4
Moisture: subxeric^4
Nutrients: submesotrophic^4

Common Species:

Trees:	
aspen	*Populus tremuloides*
Tall Shrubs:	
aspen	*Populus tremuloides*
saskatoon	*Amelanchier alnifolia*
choke cherry	*Prunus virginiana*
Low Shrubs:	
buckbrush	*Symphoricarpos occidentalis*
snowberry	*Symphoricarpos albus* (prominent in site 83)
poison ivy	*Rhus radicans*
twining honeysuckle	*Lonicera dioica*
Dwarf Shrubs:	
creeping juniper	*Juniperus horizontalis*
Forbs:	
northern bedstraw	*Galium boreale*
low goldenrod	*Solidago missouriensis*
star-flowered Solomon's seal	*Smilacina stellata*
golden bean	*Thermopsis rhombifolia*
common yarrow	*Achillea millefolium*
wild vetch	*Vicia americana*
Graminoids:	
slender wheat grass	*Agropyron trachycaulum*
purple oat grass	*Schizachne purpurascens*
smooth brome	*Bromus inermis* (prominent at site 62)
hay sedge	*Carex siccata*

Aspen / Rose - Buckbrush (*Populus tremuloides / Rosa* spp. - *Symphoricarpos occidentalis*)

Tall shrubs are a minor component of this community. Of the sites sampled, only one possessed a few tall shrubs (Site 6). Soils are predominantly rapidly drained Orthic Dark Brown Chernozems. Moisture conditions range from xeric to submesic with subxeric conditions the most prevalent. Submesotrophic sites contain species indicative of higher nutrient and moisture levels such as cream-coloured pea vine (*Lathyrus ochroleucus*), fairybells (*Disporum trachycarpum*) and white-grained mountain rice grass (*Oryzopsis asperifolia*). This community with its predominance of buckbrush and rose appears to be a transition between the drier woodland / buckbrush community and slightly moister woodland / rose community.

Community: Aspen / Rose - Buckbrush (n=5)
Sites: 6, 7, 16, 18, 53
Slope: (2-5%), (6-9%), (10-15%), (16-30%), (31-45%)
Aspect: N^3, SW^2
Level 1 Landform: E1^2, E2^2, GF1
Soil: O.DB^4, R.DB
Drainage: rapid^5
Moisture: subxeric^3, submesic, xeric
Nutrients: submesotrophic^5

Common Species:

Trees:	
aspen	*Populus tremuloides*
Tall Shrubs:	
beaked willow	*Salix bebbiana* (prominent at site 6)
Low Shrubs:	
common wild rose	*Rosa woodsii*
prickly rose	*Rosa acicularis*
buckbrush	*Symphoricarpos occidentalis*
Canada buffaloberry	*Shepherdia canadensis*
snowberry	*Symphoricarpos albus*
Forbs:	
cream-colored pea vine	*Lathyrus ochroleucus*
fairybells	*Disporum trachycarpum*
northern bedstraw	*Galium boreale*
star-flowered Solomon's seal	*Smilacina stellata*
veiny meadow rue	*Thalictrum venulosum*
harebell	*Campanula rotundifolia*
Graminoids:	
bluegrass	*Poa* spp.
slender wheat grass	*Agropyron trachycaulum*
purple oat grass	*Schizachne purpurascens*
white-grained mountain rice grass	*Oryzopsis asperifolia*
hay sedge	*Carex siccata*

Aspen / Aspen Shrub - Saskatoon - Choke Cherry / Rose (Raspberry) (*Populus tremuloides / Populus tremuloides - Amelanchier alnifolia - Prunus virginiana / Rosa* spp. (*Rubus idaeus*)

The moisture regime for this community is generally submesic with the nutrient status ranging from submesotrophic to mesotrophic. Drainage is widely variable ranging from very rapid to imperfect with rapidly drained sites the most common. It can exist on a wide range of aspects, slope angles (shallow to steep) and slope positions. However, the most common sites are shallow drainage channels or hollows. Surface moisture from spring snow melt, and spring and summer precipitation concentrates in these hollows resulting in more moist site conditions. This community consists of plant species, which prefer slightly richer and moister conditions than the previously discussed woodland communities. Common species are wild red raspberry (*Rubus idaeus*) present only with very low cover values, veiny meadow rue (*Thalictrum venulosum*), wild sarsaparilla (*Aralia nudicaulis*), American vetch (*Vicia americana*), fairybells (*Disporum trachycarpum*), Lindley's aster (*Aster ciliolatus*), cream-coloured pea vine (*Lathyrus ochroleucus*), wild lily-of-the-valley (*Maianthemum canadense*), western Canada violet (*Viola canadensis*) and white-grained mountain rice grass (*Oryzopsis asperifolia*). Dogwood (*Cornus stolonifera*) was also prominent at site 63. Even though site conditions during the 1997 field-sampling period were dry, it was evident that this site is affected by seasonal seepage. These richer sites have higher moisture levels and well-developed soils resulting in a high diversity of plant species.

Community: Aspen / Aspen Shrub - Saskatoon - Choke Cherry / Rose (Raspberry) (n=9)

Sites: 3, 10, 14, 33, 35, 49, 56, 63, 82
Slope: (0.5-2.5%)^{2}, (6-9%)^{2}, (10-15%)^{2}, (16-30%), (46-70%), (71-100%)
Aspect: NE^{3}, N^{2}, SW, NW, SE, S
Level 1 Landform: E2^{3}, E1^{2}, GF2^{2}, GF1, L3
Soil: O.DB^{6}, GL.HR, CU.R, R.DB
Drainage: rapid^{5}, well^{2}, very rapid, imperfect
Moisture: submesic^{7}, subxeric, mesic
Nutrients: mesotrophic^{5}, submesotrophic^{3}, permesotrophic

Common Species:

Trees:	
aspen	*Populus tremuloides*
Tall Shrubs:	
saskatoon	*Amelanchier alnifolia*
aspen	*Populus tremuloides*
choke cherry	*Prunus virginiana*
pin cherry	*Prunus pensylvanica*
red-osier dogwood	*Cornus stolonifera* (prominent at site 63)
Low Shrubs:	
prickly rose	*Rosa acicularis*
common wild rose	*Rosa woodsii*
wild red raspberry	*Rubus idaeus*
snowberry	*Symphoriocarpos albus*
twining honeysuckle	*Lonicera dioica*
Forbs:	
veiny meadow rue	*Thalictrum venulosum*
northern bedstraw	*Galium boreale*
wild sarsaparilla	*Aralia nudicaulis*
wild vetch	*Vicia americana*
fairybells	*Disporum trachycarpum*
Lindley's aster	*Aster ciliolatus*
western Canada violet	*Viola canadensis*
smooth aster	*Aster laevis*
wild lily-of-the-valley	*Maianthemum canadense*
American vetch	*Vicia americana*
cream-colored pea vine	*Lathyrus ochroleucus*
spreading dogbane	*Apocynum androsaemifolium*
Graminoids:	
white-grained mountain rice grass	*Oryzopsis asperifolia*
purple oat grass	*Schizachne purpurescens*
wheat grasses	*Agropyron* spp.
hay sedge	*Carex siccata*

Aspen / Rose - Raspberry (*Populus tremuloides / Rosa* spp. *- Rubus idaeus*)

This community is the most moist and richest of the all aspen woodland communities found in the Park. The underlying soils are imperfectly drained Gleyed

Cumulic Regosols and moderately well drained Orthic Black Chernozems developed on glaciolacustrine and glaciofluvial deposits adjacent to Killarney Lake. Site conditions provide the increased moisture (subhygric) and nutrient (mesotrophic to permesotrophic) levels necessary for the establishment of this lush community. As with the Aspen / Rose - Buckbrush community, tall shrubs are not a major component of the Aspen / Rose - Raspberry community. Round-leaved hawthorn (*Crataegus rotundifolia*) is a prominent shrub at site 38. Numerous species indicative of moist, rich sites are present, such as northern gooseberry (*Ribes oxycanthoides)*, bristly black currant (*Ribes lacustre)*, wild red raspberry (*Rubus idaeus)*, round-leaved hawthorn (*Crataegus rotundifolia)* and wild bergamot (*Monarda fistulosa)*.

Community: Aspen / Rose - Raspberry (n=2)

Sites: 38, 45
Slope: (2-5%), (6-9%)
Aspect: NW, N
Level 1 Landform: GL1, GF1
Soil: GLCU.R, O.BL
Drainage: imperfect, moderately well
Moisture: subhygric^2
Nutrients: permesotrophic^2

Common Species:

Trees:	
aspen	*Populus tremuloides*
Tall Shrubs:	
round-leaved hawthorn	*Crataegus rotundifolia* (prominent at site 38)
Low Shrubs:	
prickly rose	*Rosa acicularis*
northern gooseberry	*Ribes oxycanthoides*
wild red raspberry	*Rubus idaeus*
bristly black currant	*Ribes lacustre*
Forbs:	
western Canada violet	*Viola canadensis*
star-flowered Solomon's seal	*Smilacina stellata*
wild bergamot	*Monarda fistulosa*
Graminoids:	
Kentucky bluegrass	*Poa pratensis*
sedges	*Carex* spp.

10.1.4.2 **Balsam Poplar Woodland Community**; Plate 5

Balsam woodlands occur on lacustrine deposits adjacent to wetlands most often around lake shores. These stands are moist and nutrient rich which is in stark contrast to much of the aspen woodlands in the nearby uplands.

Balsam Poplar / Willow (Water Birch) (*Populus balsamifera / Salix* spp. *(Betula occidentalis)*

This community prefers moist, nutrient rich lacustrine deposits. Soils range from poorly drained Rego Gleysols to better drained Orthic and Gleyed Regosols. The soil type present and drainage is related to the stage of lakewater recession. L2 lacustrine deposits are more recently exposed beach ridges than L3 deposits and therefore are wetter. L2 soils consist of poorly drained Rego Gleysols and L3 soils consist of imperfectly drained Gleyed to Orthic Regosols. The latter soil subgroups occur further from the lake. Both of the sites examined in 1997 were located near Leane Lake. Site 50 was on the northwest side and site 24 on the eastern side. A number of species which prefer permesotrophic nutrient conditions and subhygric to hygric moisture conditions were evident at these two sites, notably horsetail (*Equisetum* spp.), wire rush (*Juncus balticus*), willow (*Salix* spp.), water birch (*Betula occidentalis*) and balsam poplar (*Populus balsamifera*).

Community: Balsam Poplar / Willow (Water Birch) (n=2)

Sites:	24, 50
Slope:	(2-5%), (6-9%)
Aspect:	SW, W
Level 1 Landform:	L2, L3
Soil:	R.G, GL.R
Drainage:	imperfect, poor
Moisture:	subhygric, hygric
Nutrients:	permesotrophic[2]

Common Species:

Trees:	
balsam poplar	*Populus balsamifera*
white birch	*Betula papyrifera* (not present at sampled sites but observed at similar site locations)
Tall Shrubs:	
pussy willow	*Salix discolor*
yellow willow	*Salix lutea*
basket willow	*Salix petiolaris*
beaked willow	*Salix bebbiana*
water birch	*Betula occidentalis*
red-osier dogwood	*Cornus stolonifera*
Low Shrubs:	
prickly rose	*Rosa acicularis*
common wild rose	*Rosa woodsii*
northern gooseberry	*Ribes oxycanthoides*
bristly black currant	*Ribes lacustre*
Forbs:	
western Canada violet	*Viola canadensis*
wild strawberry	*Fragaria virginiana* (prominent at site 50)
narrow-leaved hawkweed	*Hieracium umbellatum*
long-stalked chickweed	*Stellaria longipes*
cream-colored pea vine	*Lathyrus ochroleucus*

wild vetch	*Vicia americana*
star-flowered Solomon's seal	*Smilacina stellata*
common pink wintergreen	*Pyrola asarifolia*
perennial sow-thistle	*Sonchus arvensis* (prominent at site 50)
marsh aster	*Aster borealis* (prominent at site 50)
woodland horsetail	*Equisetum sylvaticum* (prominent at site 50)
common horsetail	*Equisetum arvense*
Graminoids:	
wire rush	*Juncus balticus*
Canada wild rye	*Elymus Canadensis*

10.2 Wetlands

Wetlands are found in lowlying areas generally associated with lakes, and pothole depressions in the glaciofluvial uplands at the north end of the Park. The wetlands are influenced by existing waterbodies and/or local drainage patterns that cause soils to remain saturated with water for long periods of time. Along lakeshores and pothole perimeters, the vegetation species and diversity reflects the increased moisture availability. Wet tall shrublands grade to wet meadows and marshes toward the center of the lakes or ponds. Parent materials underlying wetlands in the Park are organic or lacustrine deposits.

Wetlands in this report have been loosely classified based on the system proposed by Adams (1988). His classification is a hierarchical system based on form, subform and type. Parent material corresponds to the Level 1 landform in this biophysical report and coincides loosely with Adams' class form. Extensive use is also made of the Adams' subforms. Subforms are comparable with the terms used to describe moisture regime. Extending outward from permanent open water, wetland classes observed in the Park are open water, saline flats, marshes (deep and shallow), wet meadows and wet tall shrublands. These subforms can be further refined based on approximate salinity levels. No precise salinity tests were conducted during the 1997 data collection, therefore no further refinement of subforms was attempted.

10.2.1 Wet Tall Shrubland Community (TSW)

Wet tall shrublands occur around the perimeter of small pothole depressions in the Park, where willow is expanding into the centre of the depression as water levels recede. Only 1 site was sampled. This site contained both willow (*Salix* species) and red-osier dogwood (*Cornus siolonifera*) and was located at the east end of Long Lake, adjacent to a floating fen. Soils in this community were very transitional ranging from very poorly drained organic soils closer to the open water to poorly drained peaty phase Gleysols further away from the lake. This site was very wet and there was very little understory vegetation due to the thick shrub growth. Other similar communities dominated by willow were observed around organic fens (N1) in the north-east corner of the park just west of the campground. These areas appear to have thicker accumulation of organic deposits. Bands of willow were often observed as a fringe around the periphery of marshes and meadows.

Red-Osier Dogwood - Willow (*Cornus stolonifera - Salix* spp.)

Community: Red-Osier Dogwood - Willow (n=1)
Sites: 85
Slope: (2-5%)
Aspect: SW
Level 1 Landform: N2 (plot actually occurs on a narrow band of N1 organic deposits adjacent to a floating fen; this site was too small to map out as a separate N1 landform type and was complexed as part of N2)
Soil: R.G (peaty phase)
Drainage: poor
Moisture: subhydric
Nutrients: eutrophic

Common Species:

Tall Shrubs:	
red-osier dogwood	*Cornus stolonifera*
beaked willow	*Salix bebbiana*
autumn willow	*Salix serissima*
water birch	*Betula occidentalis*
Forbs:	
bog violet	*Viola nephrophylla*
one-sided wintergreen	*Orthilia secunda*
common pink wintergreen	*Pyrola asarifolia*
veiny meadow rue	*Thalictrum venulosum*
dewberry	*Rubus pubescens*
common horsetail	*Equisetum arvense*
Graminoids:	
water sedge	*Carex aquatilus*
woolly sedge	*Carex lanuginosa*

10.2.2 Wet Meadows (WM)

Wet meadows are "transitional areas that occupy the central area of shallow depressions or peripheral bands of deeper ponds" (Adams, 1988). Surface water remains temporarily in these areas in the spring or after heavy rains. The moisture is eventually lost through ground seepage and evapotranspiration. Wet meadows were observed on lacustrine and organic deposits in the Park. The organic sites appeared fen-like from a distance, however, species present indictated these sites were wet meadows. The organic deposits occur in very small pothole depressions that are "drying up", while the mineral based meadows occur along the shorelines of larger bodies of water such as Killarney, Leane and Ranger Lakes. Plots 60 and 80 appear to be transitional between a marsh and wet meadow. These two plots were classified as wet meadows based on the presence of a number of forbs that are typical consituents of such a meadow.

10.2.2.1 Wet Meadow – mineral soils Communities

Wet meadows developed on mineral soils occur in areas where water levels are receding. Two communities were separated based on the dominant vegetation species.

Northern Reed Grass - Wire Rush (*Calamagrostis inexpansa - Juncus balticus*)

Northern Reed Grass - Wire Rush communities were examined on the north end of Leane Lake and the south end of Speedy lake. Site 61 on Speedy Lake was located upslope of another wet meadow community on mineral soils classed a Sow-thistle / Three-square Rush - Foxtail Barley community at Site 60.

Community: Northern Reed Grass - Wire Rush (n=2)

Sites:	51, 61
Slope:	(0.5-2.5%), (6-9%)
Aspect:	N, SW
Level 1 Landform:	$L2^2$
Soil:	O.R, R.G
Drainage:	well, poor
Moisture:	mesic, hygric
Nutrients:	mesotrophic, permesotrophic

Common Species:

Low Shrubs:		
	balsam poplar	*Populus balsamifera* (prominent at site 51)
	beaked willow	*Salix bebbiana*
	hoary willow	*Salix candida*
Forbs:		
	Canada goldenrod	*Solidago canadensis*
	perennial sow-thistle	*Sonchus arvensis*
	marsh aster	*Aster borealis*
	annual hawk's beard	*Crepis tectorum*
Graminoids:		
	wire rush	*Juncus balticus*
	northern reed grass	*Calamagrostis inexpansa*
	graceful sedge	*Carex praegracilis*
	three-square rush	*Scirpus pungens*

Sow-thistle / Three-square Rush - Foxtail Barley (*Sonchus arvenis / Scirpus pungens - Hordeum jubatum*)

Two sites representing this community were sampled. Site 80 was located at the south end of Killarney Lake, and site 60 was located in a narrow zone between a Northern Reed Grass / Wire Rush community at Site 61, and saline lacustrine mud flats at the south end of Speedy Lake.

Community: Sow-thistle / Three-square rush - Foxtail Barley (n=2)

Sites: 60, 80
Slope: (0.5-2.5%)^2
Aspect: N^2
Level 1 Landform: L1, L2
Soil: R.G (saline), O.R
Drainage: poor, well
Moisture: subhydric, subhygric
Nutrients: hypereutrophic, permesotrophic

Common Species:

Forbs:	
perennial sow-thistle	*Sonchus arvensis*
narrow-leaved hawkweed	*Hieracium umbellatum*
Graminoids:	
three-square rush	*Scirpus pungens*
foxtail barley	*Hordeum jubatum*

10.2.2.2 **Wet Meadow – organic soils Community**; Plate 6

Wet meadows associated with poorly drained organic deposits in pothole depressions are located in the northeastern portion of the Park.

Sow-thistle - Canada Goldenrod / Northern Reed Grass - Spangletop (*Sonchus arvensis - Solidago canadensis / Calamagrostis inexpansa - Scolochloa festucacea*)

Community: Sow-thistle - Canada Goldenrod / Northern Reed Grass - Spangletop (n=2)

Sites: 74, 76, 64a(no soils or site data)
Slope: no slopes^2
Aspect: no aspect^2
Parent Material: N1^2
Soil: TY.H^2
Drainage: poor^2
Moisture: subhydric^2
Nutrients: eutrophic, hypereutrophic

Common Species:

Forbs:	
Canada goldenrod	*Solidago canadensis*
perennial sow-thistle	*Sonchus arvensis*
Canada thistle	*Cirsium arvense*
wild mint	*Mentha arvensis*

Graminoids:

northern reed grass	*Calamagrostis inexpansa*
spangletop	*Scolochloa festucacea*
fox-tail barley	*Hordeum jubatum*
water sedge	*Carex aquatilus*

10.2.3 Marshes (WMS)

Marshes are mineral wetlands or peatlands that are periodically inundated by standing water or slowly moving water. Surface water levels may fluctuate seasonally, with declining levels exposing drawdown zones of matted vegetation or mudflats. Marshes are much wetter than wet meadows and are often found in association with permanent water bodies. Marshes can be further categorized into shallow or deep communities.

10.2.3.1 Shallow Marsh Community

Shallow marshes are identified as those seasonally flooded areas that possess coarse grasses and sedges of intermediate height, and water tolerant forbs (Adams, 1988). Shallow marsh communities are often found in association with wet meadows, seasonal ponds and permanent water bodies. These marshes may exist as an inner band to wet meadows, in the central area of seasonal ponds, and as a peripheral band along permanent open water. Several sites in the Park contain communities that are transitional between a marsh and meadow. This may be the result of drier conditions, attributable to water levels receding over time, which allows for invasion by species less tolerant of very wet conditions.

Saline Shallow Marsh: Three-square Rush - Fox-tail Barley - Nuttall's Salt-meadow Grass (*Scirpus pungens - Hordeum jubatum - Puccinellia nutelliana*)

Shallow marshes in the Park have a level surface expression and contain poorly drained Rego Gleysols and imperfectly drained Gleyed Regosols. Very little soil formation is evident in the recently exposed saturated sediments of shallow marshes. The three sites sampled were located along the shorelines of Killarney and Leane Lakes. All of the shallow marshes sampled were saline and had very rich (hypereutrophic) nutrient conditions. Four halophytic species were prominent at these sites. These were the three-square rush (*Scirpus* spp.), Nuttall's salt-meadow grass (*Puccinellia nutelliana*), foxtail barley (*Hordeum jubatum*) and western sea-blite (*Suaeda calceoliformis*). On a subsequent trip to Site 57 during the summer of 1998 an abundance of Nevada rush (*Scirpus nevadensis*) was also observed. Many of the shallow marshes consist of a mosaic of plant communities each dominated by a single species. These communtities cannot be distinguished on air photos. Many of the graminoid species listed below are those dominant species.

Community: Three-square Rush - Fox-tail Barley - Nuttall's Salt-meadow Grass (n=3)

Sites: 40b, 52, 57
Slope: no slope^{2}, (0.5-2.5%)
Aspect: no aspect^{2}, E
Level 1 Landform: L1^{2}, L2
Soil: R.G^{2}, GL.R
Drainage: poor^{2}, imperfect^{1}
Moisture: hygric^{2}, subhydric
Nutrients: hypereuthrophic^{3}

Common Species:

Forbs:	
seaside buttercup	*Ranunculus cymbalaria*
western sea-blite	*Suaeda calceoliformis*
Graminoids:	
foxtail barley	*Hordeum jubatum*
three-square rush	*Scirpus pungens*
Nuttall's salt-meadow grass	*Puccinellia nuttalliana*
salt grass	*Distichlis stricta*
wire rush	*Juncus balticus*
Nevada rush	*Scirpus nevadensis*

10.2.3.2 Deep Marsh Communities

Three Great Bulrush deep marsh communities were sampled in the Park and one Common Cattail marsh was observed at the south end of Dillberry Lake. Deep marshes are wetland areas that tend to remain flooded until very late in the season and often retain some water (Adams 1988). This site type is commonly located in the central area of seasonal ponds or forms bands along the periphery of open water in lakes. Tall rushes are the most prominent vegetation at these sites.

10.2.3.2.1 Deep Marsh – mineral soils

Site 23, located along the northwest corner of Leane Lake, consisted of poorly drained lacustrine deposits. The dominants soils were Rego Gleysols. This site was saline and was the only area in the Park where liverworts were found. This site had subhydric moisture and hypereutrophic nutrient conditions.

Great Bulrush / Liverworts (*Scirpus acutus* - Liverworts)

Community: Common Bulrush/Liverworts (n=1)

Sites: 23
Slope: no slope
Aspect: no aspect
Parent Material: L2

Soil: R.G
Drainage: poor
Moisture: subhydric
Nutrients: hypereutrophic

Common Species:

Forbs:	
common cattail	Typha latifolia
Graminoids:	
great bulrush	Scirpus acutus
Liverworts:	
liverworts (not identified)	

10.2.3.2.2 Deep Marsh – organic soils

Site 64 at the north end of Speedy Lake, and site 88 located in a pool area at the south end of Dillberry Lake (south arm of Dillberry Lake which has become isolated from the remainder of the lake as a result of receding water levels) contain poorly drained Typic and Terric Humisolic organic soils, respectively. Water levels appear to be receding at these sites resulting in plant communities transitional to wet meadows. Wet meadow species are starting to invade these sites, however, the great bulrush (*Scirpus acutus)* is still very dominant. Moisture conditions at the two sites were subhydric, and nutrient levels ranged from hypereutrophic to eutrophic.

Great Bulrush (*Scirpus acutus*)

Community: Great Bulrush (n=2)
Sites: 64, 88
Slope: no slope^2
Aspect: no aspect^2
Level 1 Landform: N1^2
Soil: TY.H, T.H
Drainage: poor^2
Moisture: subhydric^2
Nutrients: hypereutrophic, eutrophic

Common Species:

Forbs:	
Canada thistle	*Cirsium arvense*
western dock	*Rumex occidentalis*
Canada goldenrod	*Solidago canadensis*
Graminoids:	
great bulrush	*Scirpus acutus*
common great bulrush	*Scirpus validus*
three-square rush	*Scirpus pungens*

10.2.4 Floating Fen (FF)

A floating fen community was observed at the east end of Long Lake and is considered a unique vegetation type. Fens tend to occur rather infrequently in the Parkland Region. This site possesses a floating mat of organic material underlain by water or fluid, loose peat. Walking over this fen produced a quaking effect. The mat was greater than 140 cm thick at the sample site. The thickness of this mat probably decreases closer to open water. The fen surface is less than 0.5 meters above lake level and the rooting zone of the vegetation mat is affected by water. Very poorly drained Hydric Humisolic organic soils underlie this floating mat. All vegetation species observed are characteristic of a rich fen. Nutrient status at this floating fen was classed as eutrophic.

Dwarf Birch / Water Sedge / Brown Moss (*Betula pumila / Carex aquatilis / Drepanocladus* spp.)

Community: Dwarf Birch/Water Sedge/Brown Moss (n=1)

Sites: 84
Slope: no slope
Aspect: no aspect
Level 1 Landform: N2
Soil: HY.H
Drainage: very poor
Moisture: hydric
Nutrients: eutrophic

Common Species:

Shrubs:	
dwarf birch	*Betula pumila*
autumn willow	*Salix serissima*
Graminoids:	
water sedge	*Carex aquatilus*
Mosses:	
brown moss	*Drepanocladus* spp.

10.2.5 Saline Flats (SF)

This is a remnant lake bottom that may be periodically flooded, and dries out exposing salt crusts after evaporation. Distinct expanses of white, salt crusted mudflats are evident around the edge of saline lake basins and vary in areal extent from year to year depending current water levels. These poorly drained sites areas are mostly non-vegetated with occasional growth of halophytic plants such as western sea-blite (*Suaeda calceoformis*). Soils are saline phase Rego Gleysols. Saline flats are evident around Speedy Lake located in the Park, and in the basins of Killarney and Leane Lakes located outside of the confines of the current project area.

Table 4: Summary of Prominent Site Characteristics associated with Vegetation Types and Communities

Vegetation Types and Communities	Slope Aspect	Ecological Moisture Regime	Soil Drainage	Nutrient Regime	Soil Subgroup	Land-form
UPLANDS:						
Active Dunes	SW, W, E	very xeric, xerix	rapid, very rapid	oligotrophic submesotrophic	O.R	E
Sand Grass - Sand Dropseed - June Grass - Blunt Sedge	SW,W,E	very xeric, xeric	rapid, very rapid	oligotrophic submesotrophic	O.R	E
Grasslands	**S, SW, W, NW, N, SE**	**very xeric, xeric, subxeric, subhygric**	**very rapid, rapid, imperfect**	**submesotrophic, mesotrophic**	**O.DB, O.R., GLSZ.BL**	**GF, E, M**
Creeping Juniper	S, SW, NW, E	xeric	very rapid, rapid, well	submesotrophic	O.DB, O.R	E, GF
Common Bearberry	S	xeric	rapid	submesotrophic	O.R	E
Western Porcupine Grass - June Grass - Slender Wheat Grass / Reindeer Lichen	S, SE	xeric, subxeric	rapid	submesotrophic	O.DB, O.R	E
Pasture Sagewort / June Grass - Blunt Sedge	SW, W	very xeric to xeric	very rapid, rapid	submesotrophic	O.DB, R.DB	GF
Needle Grass - June Grass - Wheat Grass	S, SW	subxeric	rapid	submesotrophic	O.DB	E
Needle and Thread Grass - June Grass - Slender Wheat Grass - Blunt Sedge	S, SW, N	xeric	rapid	submesotrophic	O.DB	GF
Crested Wheat Grass - Western Wheat Grass (Disturbance Community)	N, W	subxeric	rapid, well	submesotrophic	O.DB	E
Needle Grass - Sandberg Bluegrass - Blunt Sedge	S	subhygric	imperfect	mesotrophic	GLSZ.BL	M
Low Shrublands	**S, SW, W, N, NE, SE**	**xeric, subxeric, subhygric**	**rapid, imperfect**	**submesotrophic, mesotrophic**	**O.DB, R.DB, GL.R**	**GF, L**
Buckbrush	NE, SW	xeric	rapid	submesotrophic	R.DB, O.DB	GF
Aspen Shrub / Creeping Juniper	S	xeric	rapid	submesotrophic	O.DB	GF
Silverberry Shrubland	SW	subxeric	rapid	submesotrophic	O.DB	GF
Silverberry Meadow	N, SE	subxeric, subhygric	rapid, imperfect	submesotrophic & mesotrophic	O.R, GL.R	L
Rose	W	subxeric	rapid	submesotrophic	R.DB	GF
Tall Shrublands	**N, NE, SE, S, NW**	**xeric, subxeric, submesic**	**rapid, well**	**submesotrophic, mesotrophic, permesotrophic**	**O.DB, R.DB, CU.R, O.R**	**E, GF**
Aspen Shrub / Creeping Juniper / Reindeer Lichen	S	xeric, subxeric	rapid	submesotrophic	O.DB	E, GF
Aspen Shrub - Saskatoon - Choke Cherry / Buckbrush	N, S, SE	xeric, subxeric	rapid	submesotrophic	O.DB, O.R	E, GF
Aspen Shrub - Saskatoon - Choke Cherry / Rose	NE, NW	submesic	rapid	submesotrophic, mesotrophic	R.DB, CU.R, O.R	E, GF
Caragana/Smooth Brome	N	submesic	well	permesotrophic	O.DB	GF
Woodlands	**N, NE, SE, S, SW, W, NW**	**xeric, subxeric, submesic, mesic, subhygric, hygric**	**rapid, well, moderately well, imperfect, poor**	**submesotrophic, mesotrophic, permesotrophic**	**O.DB, R.DB, CU.R, GL.HR, GL.R, R.G**	**E, GF, GL, L**
Aspen / Aspen Shrub - Saskatoon - Choke Cherry / Creeping Juniper - Common Bearberry	N, NE, S	subxeric	rapid	submesotrophic	O.DB, R.DB	E, GF
Aspen / Aspen Shrub - Saskatoon - Choke Cherry / Buckbrush	S, SE, SW	subxeric	rapid	submesotrophic	O.DB	E, GF
Aspen / Rose - Buckbrush	N, SW	xeric, subxeric, submesic	rapid	submesotrophic	O.DB, R.DB	E, GF
Aspen / Young Aspen Regrowth -Saskatoon-Choke Cherry / Rose (Raspberry)	N, NE, SE, S, SW, NW	subxeric, submesic mesic	very rapid, rapid, well, imperfect	submesotrophic, mesotrophic, permesotrophic	O.DB, R.DB, CU.R, GL.HR	E, GF
Aspen / Rose - Raspberry	N, NW	subhygric	moderately well, imperfect	permesotrophic	O.BL, GLCU.R	GL, GF
Balsam Poplar / Willow (Water Birch)	SW, W	subhygric, hygric	imperfect, poor	permesotrophic	GL.R, R.G	L

Table 4: Summary of Prominent Site Characteristics associated with Vegetation Types and Communities

Vegetation Types and Communities	Slope Aspect	Ecological Moisture Regime	Soil Drainage	Nutrient Regime	Soil Subgroup	Land-form
UPLANDS:						
Active Dunes	SW, W, E	very xeric, xerix	rapid, very rapid	oligotrophic submesotrophic	O.R	E
Sand Grass - Sand Dropseed - June Grass - Blunt Sedge	SW,W,E	very xeric, xeric	rapid, very rapid	oligotrophic submesotrophic	O.R	E
Grasslands	**S, SW, W, NW, N, SE**	**very xeric, xeric, subxeric, subhygric**	**very rapid, rapid, imperfect**	**submesotrophic, mesotrophic**	**O.DB, O.R., GLSZ.BL**	**GF, E, M**
Creeping Juniper	S, SW, NW, E	xeric	very rapid, rapid, well	submesotrophic	O.DB, O.R	E, GF
Common Bearberry	S	xeric	rapid	submesotrophic	O.R	E
Western Porcupine Grass - June Grass - Slender Wheat Grass / Reindeer Lichen	S, SE	xeric, subxeric	rapid	submesotrophic	O.DB, O.R	E
Pasture Sagewort / June Grass - Blunt Sedge	SW, W	very xeric to xeric	very rapid, rapid	submesotrophic	O.DB, R.DB	GF
Needle Grass - June Grass - Wheat Grass	S, SW	subxeric	rapid	submesotrophic	O.DB	E
Needle and Thread Grass - June Grass - Slender Wheat Grass - Blunt Sedge	S, SW, N	xeric	rapid	submesotrophic	O.DB	GF
Crested Wheat Grass - Western Wheat Grass (Disturbance Community)	N, W	subxeric	rapid, well	submesotrophic	O.DB	E
Needle Grass - Sandberg Bluegrass - Blunt Sedge	S	subhygric	imperfect	mesotrophic	GLSZ.BL	M
Low Shrublands	**S, SW, W, N, NE, SE**	**xeric, subxeric, subhygric**	**rapid, imperfect**	**submesotrophic, mesotrophic**	**O.DB, R.DB, GL.R**	**GF, L**
Buckbrush	NE, SW	xeric	rapid	submesotrophic	R.DB, O.DB	GF
Aspen Shrub / Creeping Juniper	S	xeric	rapid	submesotrophic	O.DB	GF
Silverberry Shrubland	SW	subxeric	rapid	submesotrophic	O.DB	GF
Silverberry Meadow	N, SE	subxeric, subhygric	rapid, imperfect	submesotrophic & mesotrophic	O.R, GL.R	L
Rose	W	subxeric	rapid	submesotrophic	R.DB	GF
Tall Shrublands	**N, NE, SE, S, NW**	**xeric, subxeric, submesic**	**rapid, well**	**submesotrophic, mesotrophic, permesotrophic**	**O.DB, R.DB, CU.R, O.R**	**E, GF**
Aspen Shrub / Creeping Juniper / Reindeer Lichen	S	xeric, subxeric	rapid	submesotrophic	O.DB	E, GF
Aspen Shrub - Saskatoon - Choke Cherry / Buckbrush	N, S, SE	xeric, subxeric	rapid	submesotrophic	O.DB, O.R	E, GF
Aspen Shrub - Saskatoon - Choke Cherry / Rose	NE, NW	submesic	rapid	submesotrophic, mesotrophic	R.DB, CU.R, O.R	E, GF
Caragana/Smooth Brome	N	submesic	well	permesotrophic	O.DB	GF
Woodlands	**N, NE, SE, S, SW, W, NW**	**xeric, subxeric, submesic, mesic, subhygric, hygric**	**rapid, well, moderately well, imperfect, poor**	**submesotrophic, mesotrophic, permesotrophic**	**O.DB, R.DB, CU.R, GL.HR, GL.R, R.G**	**E, GF, GL, L**
Aspen / Aspen Shrub - Saskatoon - Choke Cherry / Creeping Juniper - Common Bearberry	N, NE, S	subxeric	rapid	submesotrophic	O.DB, R.DB	E, GF
Aspen / Aspen Shrub - Saskatoon - Choke Cherry / Buckbrush	S, SE, SW	subxeric	rapid	submesotrophic	O.DB	E, GF
Aspen / Rose - Buckbrush	N, SW	xeric, subxeric, submesic	rapid	submesotrophic	O.DB, R.DB	E, GF
Aspen / Young Aspen Regrowth -Saskatoon-Choke Cherry / Rose (Raspberry)	N, NE, SE, S, SW, NW	subxeric, submesic mesic	very rapid, rapid, well, imperfect	submesotrophic, mesotrophic, permesotrophic	O.DB, R.DB, CU.R, GL.HR	E, GF
Aspen / Rose - Raspberry	N, NW	subhygric	moderately well, imperfect	permesotrophic	O.BL, GLCU.R	GL, GF
Balsam Poplar / Willow (Water Birch)	SW, W	subhygric, hygric	imperfect, poor	permesotrophic	GL.R, R.G	L

Table 4: Summary of Prominent Site Characteristics associated with Vegetation Types and Communities (continued)

Vegetation Types and Communities	Slope Aspect	Ecological Moisture Regime	Soil Drainage	Nutrient Regime	Soil Subgroup	Land-form
WETLANDS:						
Wet Tall Shrubland	**SW**	**subhydric**	**poor**	**eutrophic**	**R.G (peaty), T.F**	**N**
Dogwood-Willow	SW	subhydric	poor	eutrophic	R.G (peaty), T.F	N
Wet Meadow	**N, SW, level**	**mesic, subhygric, hygric, subhydric**	**well, poor**	**permesotrophic, eutrophic, hypereutrophic**	**O.R, R.G, R.G (saline), TY.H**	**L , N**
Northern Reed Grass - Wire Rush	N, SW	mesic, hygric	well, poor	mesotrophic, permesotrophic	O.R, R.G	L
Sow-thistle - Three-square Rush - Foxtail Barley	N	subhygric, subhydric	well, poor	permesotrophic & hypereutrophic	O.R, R.G (saline)	L
Sow-thistle - Canada Goldenrod / Northern Reed Grass - Spangletop	level	subhydric	poor	eutrophic, hypereutrophic	TY.H	N
Shallow Marsh	**level**	**hygric, subhydric**	**imperfect, poor**	**hypereutrophic**	**R.G & GL.R**	**L**
Three-square Rush - Foxtail Barley - Nuttall's Salt-meadow Grass -	level	hygric, subhydric	imperfect, poor	hypereutrophic	R.G & GL.R	L
Deep Marsh	**level**	**subhydric**	**poor**	**eutrophic, hypereutrophic**	**R.G, T.H, TY.H**	**L , N**
Great Bulrush / Liverworts	level	subhydric	poor	hypereutrophic	R.G	L
Great Bulrush	level	subhydric	poor	eutrophic, hypereutrophic	T.H, TY.H	N
Floating Fen	**level**	**hydric**	**very poor**	**eutrophic**	**HY.H**	**N**
Dwarf Birch/Water Sedge/Brown Moss	level	hydric	very poor	eutrophic	HY.H	N
Saline Flats- non vegetated	**level**	**subhydric**	**very poor**	**hypereutrophic**	**R.G (saline)**	**L**

Note: Site Characteristics are described in detail in the Ecological Land Survey Site Description Manual, (Alberta Environmental Protection, 1994b) and complete descriptions of soil subgroups are found in the Canadian System of Soil Classification (Soil Classification Working Group, 1998) Soil sub-group and landform codes are described in Appendix 5

Table 4: Summary of Prominent Site Characteristics associated with Vegetation Types and Communities (continued)

Vegetation Types and Communities	Slope Aspect	Ecological Moisture Regime	Soil Drainage	Nutrient Regime	Soil Subgroup	Land-form
WETLANDS:						
Wet Tall Shrubland	**SW**	**subhydric**	**poor**	**eutrophic**	**R.G (peaty), T.F**	**N**
Dogwood-Willow	SW	subhydric	poor	eutrophic	R.G (peaty), T.F	N
Wet Meadow	**N, SW, level**	**mesic, subhygric, hygric, subhydric**	**well, poor**	**permesotrophic, eutrophic, hypereutrophic**	**O.R, R.G, R.G (saline), TY.H**	**L , N**
Northern Reed Grass - Wire Rush	N, SW	mesic, hygric	well, poor	mesotrophic, permesotrophic	O.R, R.G	L
Sow-thistle - Three-square Rush - Foxtail Barley	N	subhygric, subhydric	well, poor	permesotrophic & hypereutrophic	O.R, R.G (saline)	L
Sow-thistle - Canada Goldenrod / Northern Reed Grass - Spangletop	level	subhydric	poor	eutrophic, hypereutrophic	TY.H	N
Shallow Marsh	**level**	**hygric, subhydric**	**imperfect, poor**	**hypereutrophic**	**R.G & GL.R**	**L**
Three-square Rush - Foxtail Barley - Nuttall's Salt-meadow Grass -	level	hygric, subhydric	imperfect, poor	hypereutrophic	R.G & GL.R	L
Deep Marsh	**level**	**subhydric**	**poor**	**eutrophic, hypereutrophic**	**R.G, T.H, TY.H**	**L , N**
Great Bulrush / Liverworts	level	subhydric	poor	hypereutrophic	R.G	L
Great Bulrush	level	subhydric	poor	eutrophic, hypereutrophic	T.H, TY.H	N
Floating Fen	**level**	**hydric**	**very poor**	**eutrophic**	**HY.H**	**N**
Dwarf Birch/Water Sedge/Brown Moss	level	hydric	very poor	eutrophic	HY.H	N
Saline Flats- non vegetated	**level**	**subhydric**	**very poor**	**hypereutrophic**	**R.G (saline)**	**L**

Note: Site Characteristics are described in detail in the Ecological Land Survey Site Description Manual, (Alberta Environmental Protection, 1994b) and complete descriptions of soil subgroups are found in the Canadian System of Soil Classification (Soil Classification Working Group, 1998) Soil sub-group and landform codes are described in Appendix 5

11. VEGETATION PATTERNS

Level 2 natural history theme information represents the general pattern of vegetation types evident on the landscape. Detail provided by Level 3 descriptions athough not mappable, provides significant insight into the diversity of site conditions occurring within the Park often a result of subtle variations in topography. The Park's landscape mosaic is strongly linked to moisture levels and moisture availability associated with landform, aspect and slope position. Increased detail in the community descriptions also provides information regarding habitat and the possibility for the existence of rare species.

11.1 Vegetation Patterns (Uplands and Wetlands)

The distribution of vegetation types and communities across the landscape is linked to moisture and nutrient availability. In general, nutrients available to plants tend to increase as soil moisture increases. Two patterns are evident in Park, one associated with the uplands and the other with the wetlands. Table 4 gives an overview of community information previously presented in greater detail.

11.1.1 Upland Patterns

Upland vegetation patterns in the Park are very much dependent on aspect and slope position. In general, the driest site conditions occur in blowout areas and in the upper portions of south and west facing slopes. Moist sites in the Park are evident on the lower portions of north facing slopes and adjacent to wetlands. A progression from grasslands to low shrublands to tall shrublands to woodlands reveals a respective increase in site moisture conditions. Low shrubs species tend to be a reliable indicator of moisture conditions, therefore communities, with the exception of the grasslands, can be identified on the basis of the type and cover of low shrub species present. A consistent relationship also exists between aspect and vegetation type (refer to Table 4).

Vegetation growth at a site also influences soil moisture levels. Loss of moisture due to evapotranspiration is greatest in the grasslands, which perpetuate the already dry site conditions. In the woodlands, the foliage of the aspen canopy can trap moisture lost as a result of evapotranspiration, thereby improving moisture conditions in the understory below. Aspen stand break up opens the tree canopy, which often results in the loss of available moisture at the site and drier understory conditions. Buckbrush often invades into the understory located in these openings.

Figure 2 below displays how aspect influences vegetation patterns observed on the landscape in the sand hills. Active blowout areas possess steep, south to west exposures. Vegetation growth is limited on these sites. On stable dune surfaces dwarf shrub land and grassland communities are common. Tall shrubs or scrubby aspen communities tend to occur on the north slopes of dunes (see Plate 1).

A similar pattern occurs on the glaciofluvial terrain with the exception of pothole depressions, which have more distinct soil moisture gradients.

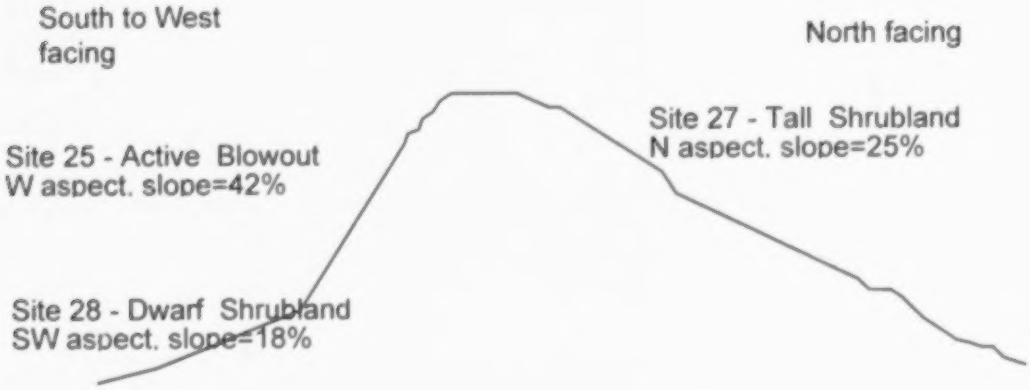


Figure 2. Vegetation pattern on dune fields. On stable dunes, grasslands and dwarf shrublands become established in former active dune areas. Short stunted aspen may occur in place of tall shrubs. Note: diagram is not to scale.

11.1.2 **Wetland Patterns**; Plate 7

Wetland vegetation patterns are influenced by the proximity to permanent or semi-permanent moisture sources (i.e. a lake or pothole depression), and water chemistry (fresh versus saline). Vegetation types and communities along this moisture gradient are well defined (Figure 3 and Plate 7). Saline marshes represent large areas containing a single species such as foxtail barley, three-square rush or Nuttall's salt meadow grass. Balsam poplar or aspen communities with a raspberry component are evident along the periphery of many of the larger wetlands. An exception would be the open silverberry meadows observed along the south shore of Killarney Lake. The perimeter of many of the smaller potholes have aspen communities grading into willow towards the centre of the depression. Shrubs eventually colonize pothole depressions that are 'drying out'. As slope angle and distance from moisture source increase, the dry upland vegetation pattern becomes more prevalent.

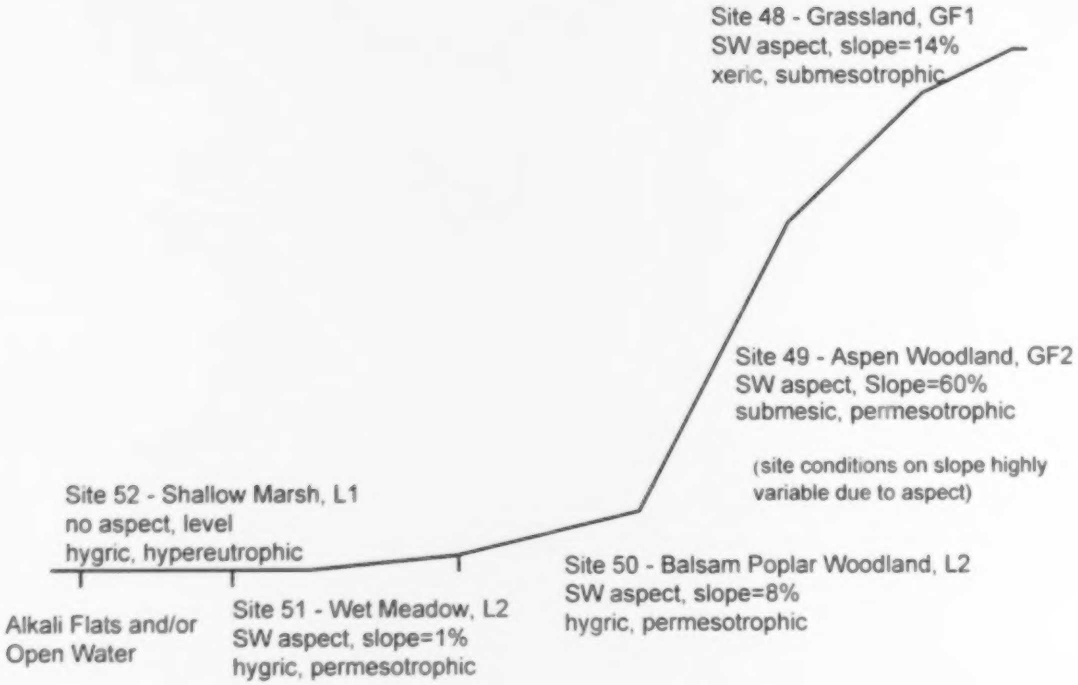

Site 48 - Grassland, GF1
SW aspect, slope=14%
xeric, submesotrophic
Site 49 - Aspen Woodland, GF2
SW aspect, Slope=60%
submesic, permesotrophic
(site conditions on slope highly variable due to aspect)
Site 52 - Shallow Marsh, L1
no aspect, level
hygric, hypereutrophic
Site 50 - Balsam Poplar Woodland, L2
SW aspect, slope=8%
hygric, permesotrophic
Alkali Flats and/or Open Water
Site 51 - Wet Meadow, L2
SW aspect, slope=1%
hygric, permesotrophic

Figure 3. Vegetation pattern along a typical Park moisture gradient from wetlands to uplands. Note the change in landform, moisture and nutrients (diagram is not to scale).

11.2 Aspen Stand Breakup; Plate 8

During the 1997 field season there was significant evidence of aspen stand break up. Canopy cover in aspen stands on dry upland sites range from 5% to 35%. In many of these stands, the older trees in the centre have died out leaving shrubby openings with high levels of deadfall. These openings are frequently surrounded by bands of progressively younger aspen. Any older trees remaining are often diseased and display low levels of vigor. These symptoms appear to be a result of stressful growing conditions that the aspen in this area are experiencing.

Vegetation in this area is constantly affected by stressful conditions associated with high temperatures and low moisture levels during the growing season. The prominence of sand and sandy soils creates conditions of rapid drainage, reducing the availability of moisture. Also the limited ability of sand particles to adsorb nutrient material reduces the availability of nutrients to plants.

In 1974 high levels of Hypoxylon canker, caused by the fungus *Hypoxylon mammatum*, was observed in the Park area (Renewable Resources Consulting Services Ltd., 1974). This disease weakens the trees main stem and results in death in 4 to 8 years. The weakened trees are also susceptible to blowdown. The resulting holes in the canopy increase exposure to wind, sun and evaporation. Hypoxylon canker is a common infestation of aspen stands growing under stress (Hiratsuka, 1987). The primary factors of moisture deficits and nutrient deficiency both caused by sandy parent material and climate, contribute to increased stress levels for upland aspen stands in the Park. Elliott et al (1967) indicated this disease was most prevalent along the southern boundary of the aspen zone in Alberta. This coincides with the Park's geographic location at the southern limits of the Central Parkland Subregion. Aspen stand breakup is very prominent in the sandy uplands, particularly on the drier mid to upper slopes and exposed undulating flats in the sandhills. Fallen woody debris makes travel through these stands very difficult for humans and large vertebrates .

Another factor contributing to the aspen stand breakup in the Park, may be the major forest tent caterpillar (*Malacosoma disstria*) outbreaks, which occurred in the area during the 1980's. These insect infestations would have provided additional stress on aspen growth.

11.3 Invasion of Introduced Plant Species

Invasion by introduced species is apparent in some areas, particularly where human activity is concentrated and areas where wetlands are 'drying up'. No field sampling was conducted in the campground, adjacent to trails or in the picnic and cottage areas; however, a number of introduced plant species were casually observed in these areas in 1998.

White sweet clover (*Melilotus alba*) and yellow sweet clover (*Melilotus officininalis*) occur sporadically in areas adjacent to Highway 17. These species appear to have invaded from the ditches alongside the highway. It appears these legumes were deliberately planted in the ditches for reclamation purposes.

Perennial sow-thistle (*Sonchus arvensis*) and canada thistle (*Cirsium arvense*) were dominant species in several of the wet meadow sites sampled. Sites 60, 74, 76 and 80 contained high covers of perennial sow-thistle, while Sites 64a and 74 contained high covers of Canada thistle. It should be noted that many of the developed hiking trails run adjacent to these wetland areas. The presence of these trails leads to increased access by people, who may unwittingly act as an additional transport mechanism for weed seed dispersal (via clothing or shoes). All of these wet meadow areas are currently drier than they have been in the past. This decrease in moisture has provided optimum growing conditions for these invasive plants. Once established, these weedy species tend to out compete many of the existing native plants. Black henbane (*Hyoscyamus niger*) was observed along portions of the Park trail winding around Speedy and Ranger Lakes. This introduced species has recently been increasing in cover (Green, 1997). The increase in henbane cover is probably a result of mowing conducted along the edges of the trails late in the summer, which may hasten seed dispersal. Mowing has been suggested as a means of controlling this species. However, it should coincide with the plant phenology in order to prevent seed release.

Several introduced species indicate past agricultural activity in areas, which are now part of the Park. Caragana (*Caragana arborescens*) and smooth brome (*Bromus inermis*) are the dominant species at Site 79, located south of Killarney Lake. The presence of caragana suggests that this was an old homestead. Caragana was often used by the early settlers for shelterbelts. Crested wheat grass (*Agropyron pectiniforme*) forms a uniform cover on a sandy flat plain area in the south central protion of the Park (Sites 17 and 19). Old furrow lines are evident indicating this area may have been cultivated at some time prior to being annexed to the Park.

Plate 1. Recent blowout (Site 34). Aspect is southwest. Stunted aspen located on the north slope can be seen in the background behind dune crest. View is similar to landscape scenario depicted in Figure 2.

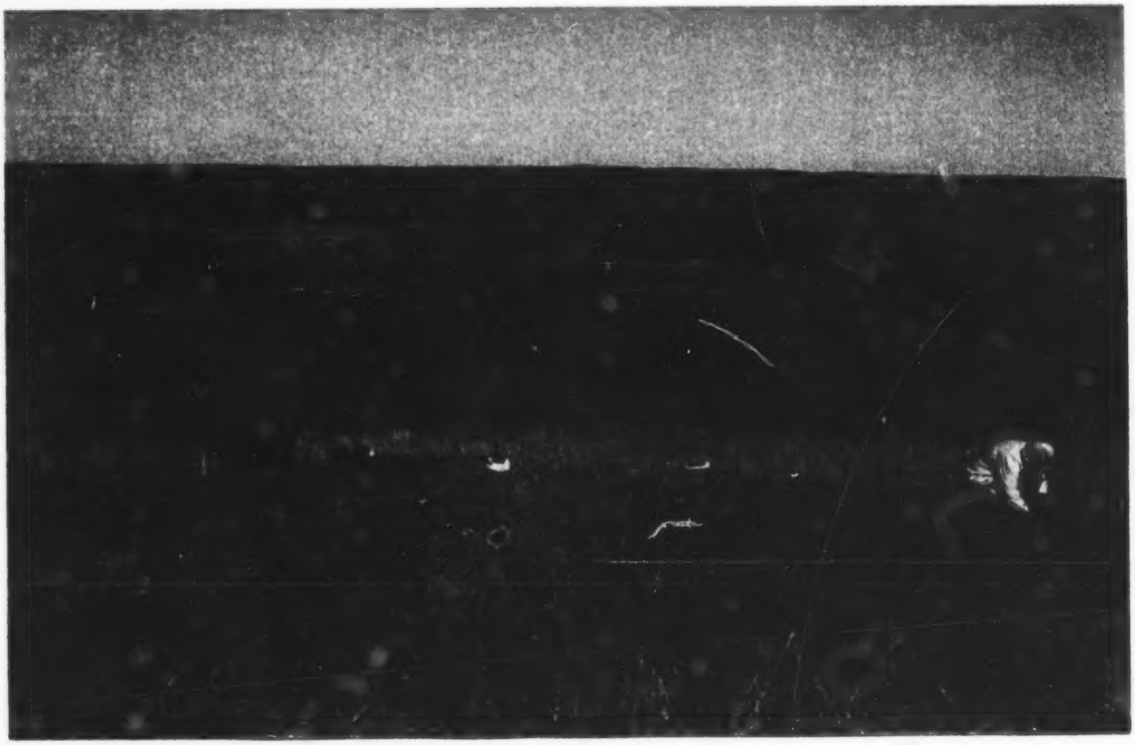


Plate 2. **View of glaciofluvial terrain, east of Site 77 (grassland) along the north boundary of the Park. Note the presence of silverberry in a slight depression in the centre of the photo.**

Plate 3. View of the undulating to hummocky eolian landscape north of Site 17 (disturbed grassland). A distinct separation is visible between the disturbed community (former cultivated field) in the foreground and the native community in the background. Furrow lines are faintly evident in the disturbed community.

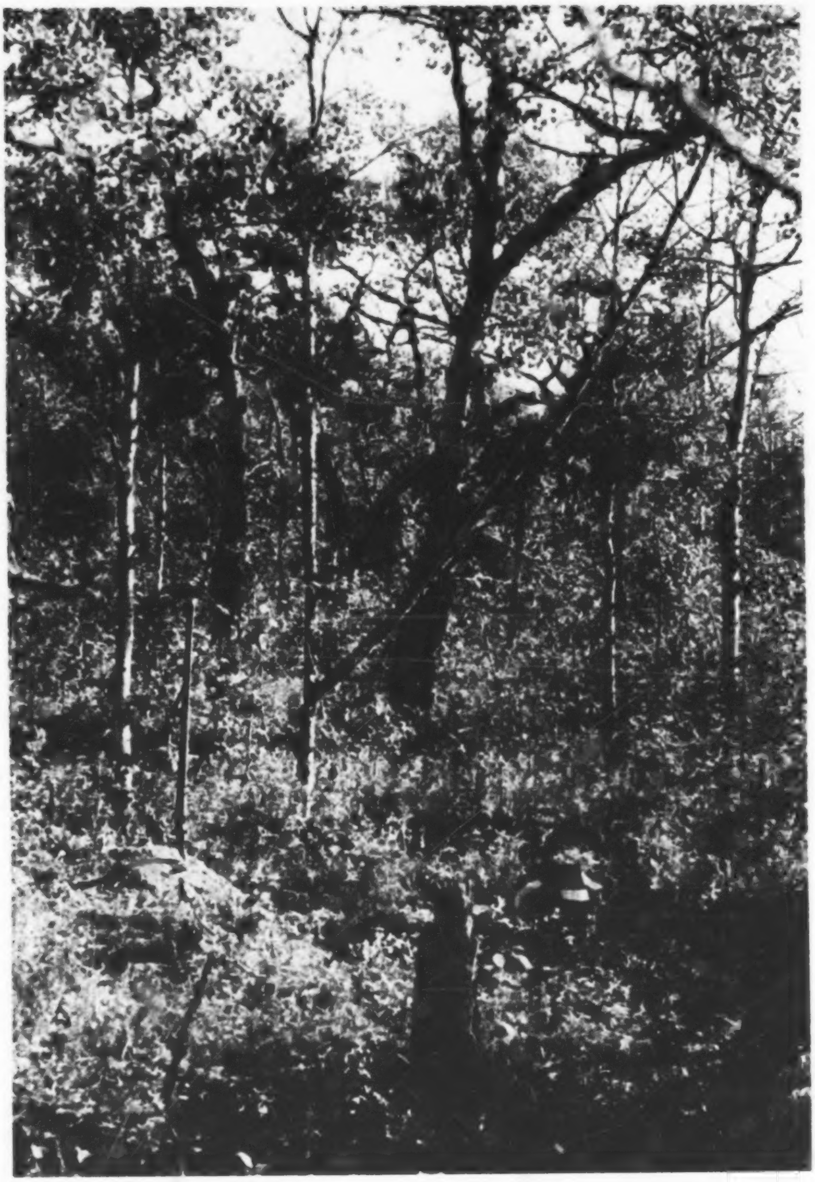


Plate 4. Scrubby Aspen / Aspen Shrub - Saskatoon - Choke Cherry / Creeping Juniper- Bearberry community on eolian sand deposits.

Plate 5. Lush vegetation in a Balsam Poplar / Willow (Water Birch) community located on lacustrine deposits (Site 50). The position of this community along the moisture gradient is shown in Figure 3.

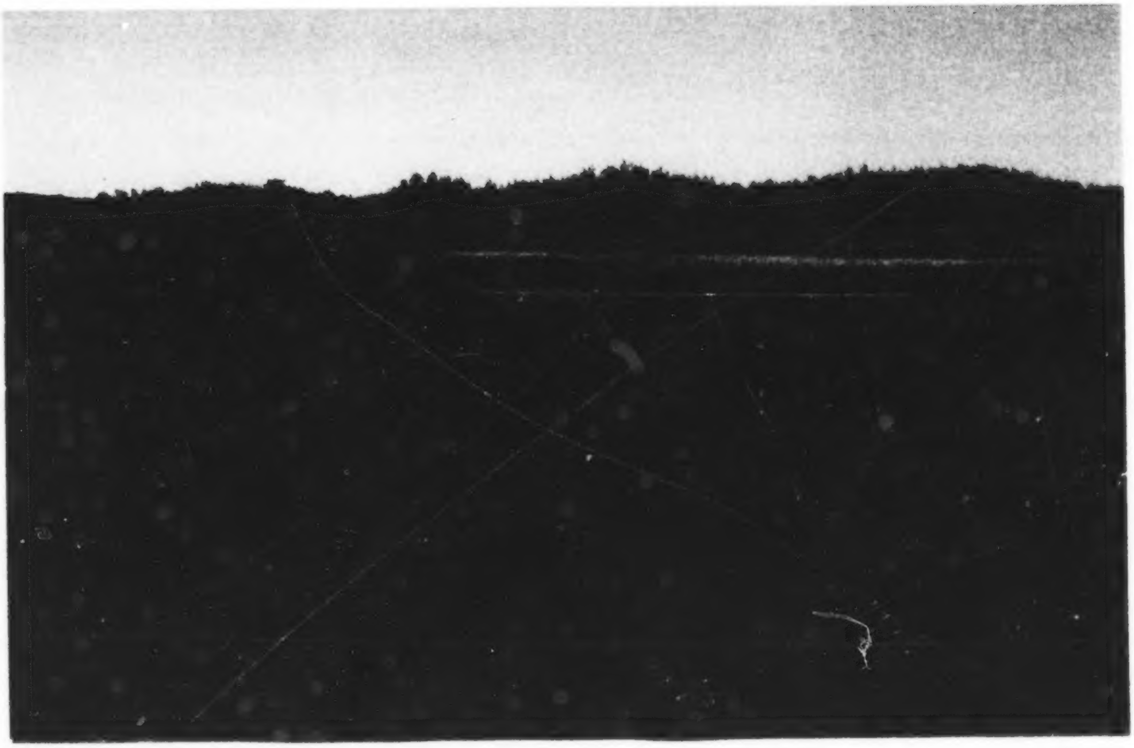


Plate 6. Wet meadow located on organic deposits in a dried out pothole depression situated in the north-east end of the Park (Site 76). Dried out pond evident in the background.

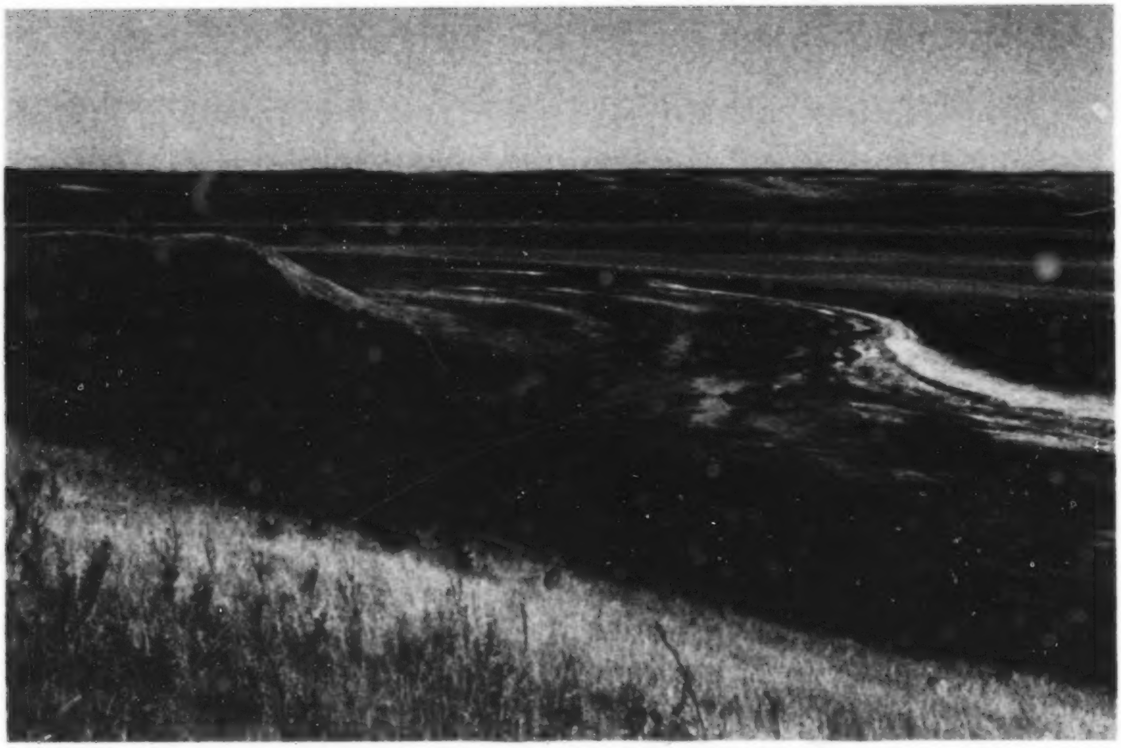


Plate 7. View of the north shore of Leane Lake, taken from the upper slopes north of the lake. Sequence of communities is similar to those shown in Figure 3. Wetland communities are very well defined in this view. This definition of communities is not as apparent on air photos.

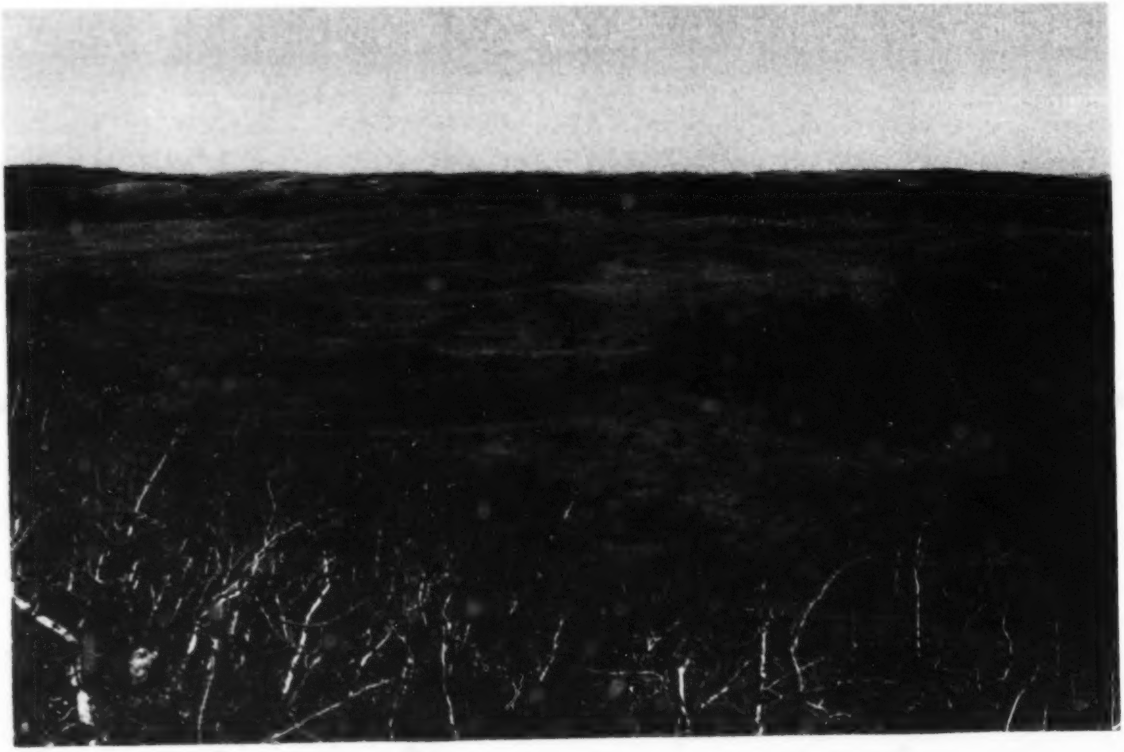


Plate 8. View north-east of Site 20 (tall shrubland) in the south end of the Park. Grasslands and shrublands have developed on stable eolian deposits. Note the aspen stand breakup in the foreground.

12. PARK FAUNA

New information on the faunal resources of the Park is very limited in this report for the following reasons:

1) 1997 field investigations focused primarily on site, soil and vegetation characteristics of the Park,
2) very few wildlife inventories have been conducted in the Park
3) high temperatures and dry conditions during the field sampling in the summer of 1997 caused animals to remain hidden from view for even casual observations.

12.1 Mammals

Only a few mammals were observed during the 1997 field season. Numerous deer, both mule deer (*Odocoileus hermionus*) and white-tailed deer (*Odocoileus virginianus*) were observed along an old overgrown road in the south end of the Park during a reconnaissance trip taken two weeks prior to field sampling. Pronghorn antelope (*Antilocapra americana*) were observed several kilometres south of the Park along Highway 17 during the sampling period.

It appears that a healthy population of both white-tailed and mule deer exists in the vicinity of Dillberry Lake Provincial Park. In the winter of 1996/97, complaints were made to the regional Wildlife Management office in Vermilion about approximately 500 white-tailed deer congregating in a quarter section near Reflex Lake (Moore, 1997). A January, 1996 aerial survey of a 5 km by 5 km block from Killarney Lake north recorded 76 white-tailed deer and 44 mule deer. The terrain in this block is similar to that found in the Park and with a few corrections, these populations could be extrapolated to the Park. A survey block directly south-west of the Killarney Lake block contained 216 white-tailed and 83 mule deer indicating more preferable habitat in the higher hills south of the Park (Moore, 1997). Moore (1997) also noted that the moose (*Alces alces*) were appearing in greater numbers in the eastern part of the province. Some moose scat was observed in the shrubby wetland areas in the Park during the 1997 biophysical field investigations.

Beavers (*Castor canadensis*) have resided in the Park in the past. However, no current beaver activity was evident during the 1997 summer field investigations. Remnants of several old beaver dams were observed on Speedy Lake and at the southern arm of Dillberry Lake, which is currently drying up. Old beaver channels were visible around most of the water bodies except Leane and Killarney Lakes. The channels are currently over grown with water sedge (*Carex aquatilus*). Signs of trees cut down by beaver sometime in the past are also evident in these areas.

Coyotes (*Canis latrans*) are very common carnivore in the Park and surrounding area (Moore, 1997). During the summer of 1995, Park officials destroyed a black bear (*Ursus americanus*) in the Park (Moore, 1997). Black bears are not common in the Park.

A number of other mammals may inhabit the Park according to the range maps presented by Smith (1993). These include:

- 5 species of shrews (Order Insectivora),
- 4 species of bats (Order Chiroptera),
- 2 species of rabbits and hares (Order Lagomorpha),
- 12 species of rodents (Order Rodentia) including porcupine (*Erethizon dorsatum*), meadow vole (*Microtus pennsylvanicus*), prairie vole (*Microtus ochrogaster*),
- several species of ground squirrels such as the Richardson's ground squirrel (*Spermophilus richardsonii*) and thirteen-lined ground squirrel (*Spermophilus tridecemlineatus*)
- 8 species of carnivores (Carnivora) including red fox (*Vulpes vulpes*), mink (*Mustela vision*) and several species of weasel (*Mustela* spp.).

See Appendix 3 for a complete list of mammals that may occur in the Park.

12.2 Amphibians and Reptiles

According to distribution maps in The Amphibians and Reptiles of Alberta (Russell and Bauer, 1993), the Park occurs within the range of several amphibians and reptiles. They include the Canadian toad (*Bufo hemiophrys*), striped chorus frog (*Pseudacris triseriata*), wood frog (*Rana sylvatica*), leopard frog (*Rana pipiens*) and plains garter snake (*Thamnophis radix*).

Populations of a number of amphibians have declined significantly over the last several decades. Currently, both the Canadian toad and northern leopard frog have been Red Listed in Alberta (Alberta Environmental Protection, 1996). A Red List designation indicates that these two species are at risk. A 1974, consultants (Renewable Resources Consulting Services Ltd.) reported potential northern leopard frog habitat northwest Dillberry Lake, however, no actual frogs were seen or heard at the time. A 1982, audio record of a northern leopard frog by Wershler and Wallis at an upland pond just north Killarney Lake is the last recorded evidence of this frog species in this area (Wagner, 1997). As a result of this severe decline in numbers, the northern leopard frog was given protection as an endangered species under the provincial Wildlife Act in 1997 (Wagner, 1997). The current status of the northern leopard frog is further discussed in Section 4.1.5.

In the past, Canadian toads have been recorded just south of the Battle River along the provincial boundary (Roberts, 1992). However, according to Hamilton et al. (1998) "recent anecdotal reports have suggested that the species is declining in numbers in some parts of its provincial range" which may include the area around the Park. Section 14.2.3.2 provides further discussion on the status of the Canadian toad.

The plains garter snake is currently on the Yellow A List. This designates species that are not currently considered at risk, but may require special management to prevent them from becoming at risk in the future (Alberta Environmental Protection, 1996). More discussion on this snake's status is provided in Section 14.2.3.2.

It is likely that viable populations of striped chorus frogs, wood frogs and plains garter snakes still inhabit the Park and vicinity since no literature to the contrary was noted. Habitat in the Park preferred by striped chorus frogs would be grassy pools, lakes, marshes and almost any water body. Wood frogs prefer wooded areas such as those along large lakes and ponds in the Park and open ponds.

12.3 Birds

Numerous species of birds occupy a wide variety of habitats in the Park, which represents one of the few remnants of natural upland and wetland landscapes left in the Central Parkland Natural Subregion. A species list was prepared by Macdonald and McIsaac (1993) identifying 216 birds, that occupy the Park as residents or migrants passing through (see Appendix 2 for a complete listing). This was done as part of the Alberta's Watchable Wildlife program. Additional information regarding shorebird inhabitants of the Park is presented under the features of national significance section later in this report.

13. LAKES AND AQUATIC ENVIRONMENT

Dillberry Lake Provincial Park contains an assortment of open water bodies. Six lakes are situated within the Park or along its boundary (see Figure 1). The four largest are officially named. These are Killarney, Dillberry, Leane and Long Lakes. The remaining two are referred to locally as Speedy and Ranger Lakes. Refer to Figure 1 for locations.

Much of the lake morphometric data presented here was collected during the 1970's (Renewable Resources Consulting Services Ltd., 1974), and may not represent current water levels. Alberta Environment data indicates that the highest water levels recorded for Dillberry Lake occurred during the mid 1970's. The lowest levels recorded for Dillberry Lake were in 1981. Since then water levels have rebounded somewhat. It is assumed that these water levels reflect local variations in the local water table, and that similar fluctuations would be evident in surrounding lakes. In drier seasons, only the deeper parts of the lakes contain water as evidenced by air photos taken during late summer.

Most of the lakes in this region are fed by runoff from the surrounding upland and local springs. Killarney and Leane Lake occasionally receive surface inflow from surrounding water bodies, however, this is minimal. Killarney Lake receives artificially regulated inflow from a nearby unnamed lake, while Leane Lake receives intermittent flow from another nearby unnamed lake. All of the lakes in the region are relatively shallow and are often referred to as pothole lakes. In this climatic zone, evaporation often exceeds precipitation during the summer months. This results in decreased water levels in most of the Park's lakes, which are heavily dependent upon local drainage for water supply. Most shallow lakes are thoroughly mixed by wind and show little or no stratification throughout their depths.

Little information is available for the smaller lakes or potholes.

13.1 Lake Basin Characteristics

13.1.1 Dillberry Lake

The Alberta-Saskatchewan border represents the eastern Park boundary. It also cuts north-south across Dillberry Lake which is the deepest lake in the Park. Dillberry Lake is the only large fresh-water lake in the area, and as a result receives the heavy recreational use. Campgrounds and cabins have been developed along its shores. On the Saskatchewan side this lake is use as a water source by grazing cattle. The lake basin has a total surface area of approximately 80 ha. Most of the lake is less than 3 m deep with 3 local pockets possessing depths between 6 and 10 meters. These pockets are considered deep enough to over-winter stocked rainbow trout (Finlay and Finlay, 1987). Dillberry Lake is classed as oligotrophic (nutrient poor) and as a result does not contain a lot of aquatic algae and plant growth. This characteristic makes it suitable as a recreational lake. An Alberta Environment NAQUADAT station (AB05GA0160) monitors water quality at Dillberry Lake.

13.1.2 Killarney Lake and Leane Lake

Killarney lake has a large surface area of approximately 480 ha, however it is relatively shallow with a maximum depth of 4.3 m. This lake is classed as eutrophic or nutrient rich.

Leane Lake covers roughly 220 ha and has a maximum depth of 1.5 m. During dry periods this lake may contain very little water. Aerial photography taken in August

1992 displays an almost dry lake basin.

Both of these lakes are saline and have pH's that are highly alkaline. They possess high levels of total dissolved solids and sodium. When water levels recede, white mineral crusts covering the exposed lake sediment are evident along the shore. These saline mud flats are used extensively by migratory shorebirds (Finlay and Finlay, 1987; Moore, 1997). The importance of these saline crusted mud flats is further discussed under features of national significance.

13.1.3 Long Lake

This freshwater lake has a surface area of approximately 40 ha. It is also relatively shallow with a small deep basin (5.9 m) located in the western portion of the lake. Finlay and Finlay (1987) indicate that this lake provides excellent habitat for water birds.

13.1.4 Ranger and Speedy Lakes

Whether these water bodies should be considered lakes is questionable. Both are very small, however, they provide critical habitat for birds and other animals. Very little information is available about these lakes with regards to their water levels and water quality. From the 1997 summer field observations, the water in these two lakes appeared to be saline. Salinity was inferred from the presence of salt crusts on exposed lake sediments around the perimeter of the lakes.

Detailed hydrologic data for the Park area is very limited and further study is suggested. Additional detailed information regarding lake morphometry and the aquatic ecosystems present may be found in the Dillberry Lake-Resource Inventory and Analysis report prepared by Renewable Resources Consulting Services Ltd. (1974).

14. SIGNIFICANT FEATURES

Significant features are those attributes or species present in the Park found only in relatively few places from a national, provincial or regional perspective. The significance of an area is often based on the presence of an unusual landform or the combination of landforms and vegetation communities (or lack thereof) to create habitats that possess very specific characteristics. These habitats are generally very site specific and meet very rigid habitat conditions required by certain living species (flora or fauna). Such narrowly defined habitats are often naturally quite limited and have become even more rare in the Central Parkland as a result of extensive agricultural and industrial activity.

It should be recognized that the list of significant species provided here is based solely on currently available information, and data collected during the 1997 field season, which in all likelihood is incomplete. Information and research regarding rare species is rather limited and where available is generally associated with species that are well known. Many categories, such as invertebrates, are currently not studied to any great extent, and have been totally omitted from this report due to of lack of information. In the future, as information becomes available, many more species may be added to the list of life forms, which inhabit the Park.

Significant features can be incorporated into the third level of the Natural History Theme classification system. Significant features often correspond to specific plant communities, which are defined at the Level 3 stage. Figure 4 displays the location of site specific significant features in the Park.

14.1 Nationally Significant Features

Features of national significance are those attributes or species existing within the Park that are unique or rare, and are found only in a relatively few places within Canada. Landforms in the Park are not considered unique when viewed from a national perspective. Glaciofluvial knob and kettle topography and dunefields are common throughout the Canadian prairies.

Aspects of national and international significance in the Park are associated with the presence and recorded abundance of a number of avifauna or birds and one amphibian (northern leopard frog), and a critical waterfowl habitat. Presence of these bird species is confirmed by the checklist of birds for the Park and vicinity prepared by Macdonald and McIsaac, 1993. The potential presence of the northern leopard frog in the vicinity of the Park is inferred from the distribution maps and natural history descriptions in Russell and Bauer, 1993.

Animal species of national significance are considered in this section of the report as those recognized as endangered, threatened or vulnerable by the Committee on the Status of Endangered Wildlife in Canada (COSEWIC, 1998). COSEWIC (1998) defines:

- an endangered species as "a species facing imminent extirpation or extinction",
- threatened represents "a species likely to become endangered if limiting factors are not reversed",
- and vulnerable signifies "a species of special concern because of characteristics that make it particularly sensitive to human activities or natural events".

14.1.1 Piping Plover (COSEWIC endangered)

The presence of piping plovers and its habitat in Dillberry Lake Provincial Park should be considered of prime national significance. In 1985, COSEWIC moved this species from the threatened to the endangered list. This species is currently Red Listed in Alberta (Alberta Environmental Protection, 1996) which indicates that "populations of these species have declined or are believed to have declined, to nonvialbe levels, or show a rate of decrease indicating that they are at immediate risk of declining to nonviable levels in Alberta".

Piping plovers require a very specific type of terrain for nesting habitat, which is often found along shorelines of large saline lakes with the fluctuating water levels. Nesting sites are typically located on relatively wide, sparsely vegetated shorelines and exposed gravel substrates which provide, suitable nesting materials (gravels), obstruction free vision for nesting adults and an escape route (Prescott, 1997).

Saline mudflats located on both Leane and Killarney Lake possess the required nesting habitat. Piping plovers have been observed at Killarney Lake during eight of the last 10 years (Goossen, 1997). 1996 and 1997 surveys indicated the presence of nesting plovers at Killarney Lake (Richardson, 1997). A maximum of 20 adult birds were observed early in the 1997 season and a total of seven nests were recorded (Richardson, 1997). Piping plovers were also observed at Leane Lake from 1994 to 1996 (Goossen, 1997) with only a single nest reported in 1994 (Heckbert, 1994). No piping plovers were observed at Leane Lake during 1997 (Richardson, 1997).

For a complete and current review of the status of the piping plover in Alberta see Prescott (1997). An extensive database including an atlas of piping plover sites in Alberta and adjacent Saskatchewan sites is currently being prepared by a team of Canadian Wildlife Service, Environment Canada staff headed by Paul Goossen. This database should be available in the near future.

14.1.2 Loggerhead Shrike (COSEWIC threatened)

Reduction in populations of loggerhead shrikes is a result of the loss of winter and breeding habitat and the reduced diversity and availability of prey such as large insects, mice and an occasional small songbird due to poisoning by fertilizers and insecticides. The preferred habitat of loggerhead shrikes is open grasslands for hunting prey and shrub tickets for perching and nesting. The Status of Alberta Wildlife places this shrike species on their Yellow A List which signifies species "for which there has been concern expressed over long term declines in their numbers" (Alberta Environmental Protection, 1996). Populations are considered low and poorly understood and declines have been observed in the past number of years. The Park provides undisturbed remants of suitable habitat.

14.1.3 Ferruginous Hawk (COSEWIC vulnerable)

Ferruginous hawks are found primarily in the Grassland Natural Region in moderately cultivated areas and large expanses of natural grasslands with abundant prey primarily ground squirrels and occasional hares, voles, mice and birds (Semenchuk, 1992). These hawks occasionally nest outside their preferred range. The expansion of agriculture and the encroachment of shrublands and woodlands into grasslands in the Parkland is reducing this hawk's preferred habitat and as a result numbers are disappearing. It is unlikely that the Park contains enough open grassland with large enough populations of prey to sustain a breeding pair of hawks.

14.1.4 Short-eared Owl (COSEWIC vulnerable)

The preferred breeding habitat for this species of owls is grasslands, grassy or bushy meadows, marshy areas, pastures, cultivated land and cleared areas that were former forests. These sites provide the necessary cover and hunting areas to sustain these birds. These owls breed primarily in the Grassland and Parkland Regions (Semenchuk, 1992). The Status of Alberta Wildlife places the short-eared owl on its Blue List which suggests that this species may be at risk in this province due to non-cyclic declines in numbers and disappearance of suitable habitat (Alberta Environmental Protection, 1996).

14.1.5 Northern Leopard Frog (COSEWIC vulnerable)

The northern leopard frog is experiencing severe declines in population which were first noticed in 1978 (Russell and Bauer, 1993). Once common throughout the province, northern leopard frogs are found only in small isolated areas in the Grassland and Parkland Natural Regions. These frogs inhabit springs, streams, marshes and other permanent water bodies with abundant aquatic vegetation (Russell and Bauer, 1993). The frog's diet consists of insects, spiders, other small invertebrates and the occasional small birds, garter snakes, tadpoles, mature frogs and small fish. The species overwinter by hibernating in the mud at the base of standing water and under rocks in streams and springs. According to Russell and Bauer (1993) possible causes of population declines are herbicide and pesticide pollution, and several consecutive drought years drying up breeding areas, and the high mortality of adults during winter hibernation. The Status of Alberta Wildlife (Alberta Environmental Protection, 1996) places the northern leopard frog on the Red List which indicates that these species are at risk due to populations declining to nonviable levels. This frog was given protection as an "endangered" species under the provincial Wildlife Act in 1997. According to Wagner (1997) this species appears to be extirpated over most of central Alberta. However, a very recent new siting of a northern leopard frog was received for a location near Wainwright (Takats, 1999). It is too early to tell from this one siting if this frog is making a comeback. It appears that the northern leopard frog currently does not exist in the Park since there are no recent records confirming its presence.

14.1.6 Designation as a Potential Western Hemisphere Shorebird Reserve Network (WHSRN) Site

The saline wetlands in the Park form an integral part of an extensive wetland complex that includes Reflex Lake located along the Alberta-Saskatchewan border north of the Park. These wetlands serve as important nesting and staging areas for migrating shorebirds. The high number of species and large concentration of birds indicate that this may an internationally significant area. Shorebird surveys were conducted at a number of sites in the Dillberry Lake area as part of a cooperative program between Canadian Wildlife Service, Environment Canada and the Saskatchewan Wetland Conservation Corporation during the summers of 1995 and 1996. Two of the sites included Killarney Lake and Leane Lake. These sites were surveyed in conjunction with several sites at Reflex Lake for the purposes of establishing a database to be used towards nominating this area as a potential Western Hemisphere Shorebird Reserve Network site. The following is a list of shorebird species observed at Leane and Killarney Lake during recent surveys (Beyersbergen, 1997). Scientific names follow Godfrey (1986).

American avocet	*Recurvirostra americana*
Baird's sandpiper	*Calidris bairdii*
black-bellied plover	*Pluvialis squatarola*
dowitcher species (long-billed and short-billed)	*Limnodromus* spp
common snipe	*Gallinago gallinago*
killdeer	*Charadrius vociferus*
lesser yellowlegs	*Tringa flavipes*
least sandpiper	*Calidris minutilla*
marbled godwit	*Limosa fedoa*
pectoral sandpiper	*Calidris melanotos*
piping plover	*Charadrius melodus*
red-necked phalarope	*Phalaropus lobatus*
red knot	*Calidris canutus*
ruddy turnstone	*Arenaria interpres*
sanderling	*Calidris alba*
semipalmated plover	*Charadrius semipalmatus*
semipalmated sandpiper	*Calidris pusilla*
stilt sandpiper	*Calidris himantopus*
willet	*Catoptrophorus semipalmatus*
Wilson's phalarope	*Phalaropus tricolor*
white-rumped sandpiper	*Calidris fuscicollis*

Dillberry Lake Provincial Park is part of an internationally significant shorebird migration area. The largest concentrations of stilt sandpipers in the world were recorded in this area (Alberta Environmental Protection, 1997). Both Killarney and Leane Lakes, along with Reflex Lake and several other lakes in the area provide excellent shorebird habitat and are included in the proposed WHSRN site. The mud flats, marshes and meadows on these shallow, saline lakes provide suitable nesting habitat, along with readily accessible food sources and escape routes.

14.2 Provincially Significant Features

Many of the provincially significant features are plant and animal species associated with specific Parkland habitats. As these habitats diminish, so too does the viability of the flora and fauna species associated with these habitats.

Provincially significant fauna for the purposes of this report are defined as those species 'Red Listed', 'Blue Listed and 'Yellow Listed' by the Alberta Environmental Protection Wildlife Status Report (Alberta Environmental Protection, 1996), which are not designated as endangered, threatened or vulnerable by COSEWIC (1998).

Red Listed species are at risk and "have declined or are believed to have declined, to nonviable levels, or show a rate of decrease indicating that they are at immediate risk of declining to non-viable levels in Alberta" (Alberta Environmental Protection, 1996). Blue Listed species may be at risk and "are particularly vulnerable because of non-cyclical declines in population or habitat, or reductions in provincial distribution" (Alberta Environmental Protection, 1996). Yellow Listed species are considered sensitive species or those:

> "Not currently believed to be at risk, but [which] may require special management to address concerns related to naturally low populations, limited provincial distributions, or demographic/life history features that make them vulnerable to human-related changes to the environment" (Alberta Environmental Protection, 1996).

This category has been further subdivided to define population trends and distributions. Yellow A Listed species are those species which must be closely observed since those populations have shown a long-term decline in number, while Yellow B Listed species include those that are:

1. naturally rare but are not in decline,
2. naturally rare and have clumped breeding distributions, or
3. associated with habitat or habitat elements that are or may be deteriorating (Alberta Environmental Protection, 1996).

Provincially significant flora include those plant species on the Alberta Natural Heritage Information Centre (ANHIC) 1996 tracking list primarily the S1 and S2 ranked species and some S3 ranked species. Definitions for these categories are as follows;

> S1 - less than or equal to 5 occurrences or only a few remaining individuals or may be imperiled because some factor of its biology makes it especially vulnerable to extirpation.
>
> S2 - 6 to 20 occurrences or with many individuals in fewer occurrences; or may be susceptible to extirpation because of some factor of biology.
>
> S3 - 21 to 100 occurrences, may be rare and local throughout its range, or in a restricted range.

Provincially significant plant communities include those communities ranked S1 or S2 on the 1999 ANHIC preliminary plant community tracking list. Those communities not yet ranked (S?) may also be included.

14.2.1 Alberta Natural Heritage Information Centre (ANHIC) - Plant Species of Concern

Several species on the 1996 ANHIC list were encountered in the Park. It should be noted that the fieldwork conducted during the summer of 1997 did not include a rare plant survey component. Had a specific rare plant survey been conducted perhaps more plants of concern may have been observed. Future rare plant surveys should be directed to some of the active dune sites, grasslands and spring areas.

Two species, low milkweed (*Asclepias ovalifolia*) and silverleaf psoralea (*Psoralea argophylla*) listed on the Alberta vascular plants tracking list (Alberta Natural Heritage Information Centre, 1996), were observed in the Park during the 1997 field investigations (Figure 4). Low milkweed was ranked as S2 and silverleaf psorlea was ranked as S2/S3. Note these two plant species have since been ranked as S3 according to the 1999 ANHIC tracking list for vascular plants and mosses.

Low Milkweed

Low milkweed was observed during a reconnaissance field trip prior to field sampling in the summer of 1997 at the south end of the Park along the side of the road leading to the abandoned staff residences. The grassland area where the milkweed was found borders on open woodlands and is underlain by rapidly drained Orthic Dark Brown Cheronzemic soils developed on coarse sandy eolian deposits. This species tends to occur in moist microsites in shallow hollows along the edges of fields and pastures in the grasslands and southern aspen parklands (Vance et al., 1993). An earlier inventory of this area indicated that low milkweed was relatively common in the area (Renewable Resources Consulting Services Ltd., 1974).

Silverleaf Psoralea

Silverleaf psoralea was recorded at Site 77 in a dwarf shrub community situated along the north boundary of the Park just east of Highway 17. This site occurred on an upper slope with an east aspect and a slope angle of 15° in an area of hummocky glaciofluvial terrain. Moisture conditions at this site were subxeric. This species prefers to grow on dry prairie uplands near the edge of the aspen parkland (Vance et al., 1993). The Dillberry Lake Provincial Park site would represent the northern edge of the range of this species.

14.2.2 Alberta Natural Heritage Information Centre (ANHIC) - Plant Communities of Concern

Several plant communities encountered in Dillberry Lake Provincial Park are listed on the 1999 ANHIC preliminary plant community tracking list. These communities fall into the *Puccinellia nuttalliana* alliance, which is ranked as an S2, and the *Festuca hallii* alliance and *Sporobolus cryptandrus* alliance, both of which are S?.

The *Puccinellia nuttalliana – Suaeda calceoliformis – Spergularia marina* community on the tracking list is similar to the Three-square Rush - Fox-tail Barley - Nuttall's Salt - Meadow Grass community described earlier in this report. Two sample sites observed on lacustrine sediments along Killarney Lake and Leane Lake fall into this ANHIC community. Sites 40b and 52 based on the their species composition, appear to fit the tracking list community well.

Plains rough fescue (*Festuca hallii*) was present in trace amounts at several grassland sites. This grass species was present in higher covers at only two sites. Site 36 represents a Creeping Juniper dwarf shrubland community located as short distance SSE of the old Park residences, and Site 9 represents a Western Porcupine Grass - June Grass - Slender Wheat Grass / Reindeer Lichen community located approximately 375 meters west of Site 36. The dominant species at Site 36 were creeping juniper (40% cover), lichen (20%) and plains rough fescue (10%). A cover of 2% rough fescue was present at Site 9. These fescue covers are much lower than values associated with site information assessed by Weerstra and Weerstra (1998) in their preliminary classification of plains rough fescue community types within the Central Parkland Subregion of Alberta. The dwarf shrubland community at Site 36 does not fit well into any of the fescue community types compiled by Weerstra and Weerstra (1998). Their preliminary classification only took into account sites with dwarf shrub community coverage of 25% or less.

Sand dropseed (*Sporobolus cryptandrus*) was associated with active dune areas or blowout areas within the Park. A high level of surface disturbance caused by wind erosion was evident at these sites. Sand dropseed was present at only one of the blowouts sampled (Site 34) with a cover of 1%. However, it was casually observed on several occasions at several blowout areas.

Refer to Map 1 and Figure 4 for 1997 field sample site locations representing these communities.

14.2.3 Significant Fauna

A number of Red, Blue and Yellow Listed (Alberta Environmental Protection, 1996) faunal species have habitat ranges which extend through Dillberry Lake Provincial Park (Smith, 1993; Russell and Bauer, 1993; Semenchuk, 1992). These include five species of mammals, 23 species of birds, two amphibians and one reptile. Many of these species are highly mobile and may be occasional visitors to the Park rather than permanent residents.

14.2.3.1 Mammals

The Richardson's ground squirrel (*Spermophilus richardsonii*), thirteen-lined ground squirrel (*Spermophilus tridecemlineatus*), long-tailed weasel (*Mustela frenata*) and badger (*Taxidea taxus*) are Yellow A Listed, while the pronghorn antelope (*Antilocapra americana*) has been Yellow B Listed. Data indicating the presence of these species in the Park were not available. However, the possible presence of a species was assumed by the existence of their preferred or required habitats.

Richardson's Ground Squirrel

The Richardson's ground squirrel prefers rolling open grasslands underlain by sandy soils which allow easy burrowing (Smith, 1993; Banfield, 1974). This species is common but is currently in decline (Alberta Environmental Protection, 1996). Decreases in this species have significant implications for a number of Yellow Listed raptors, which utilize this ground squirrel as a primary food source.

Thirteen-lined Ground Squirrel

Unlike the Richardson's ground squirrel, the thirteen-lined ground squirrel inhabits the transitional zones between shrublands and open grasslands. They are generally found along the edges of shrublands in areas possessing a high cover of non-woody vegetation (Smith, 1993). The current population status of this squirrel is unknown, however, there is some suggestion that the species is in decline (Alberta Environmental Protection, 1996).

Long-tailed Weasel

The long-tailed weasel's range extends through the grasslands and parklands with a preference for areas near open water (Banfield, 1974). This species is locally abundant, but appears to be disappearing from some habitats (Alberta Environmental Protection, 1996).

Badger

Like the Richardson's ground squirrel, the badger is a species of the open grasslands (Smith, 1993). A range of opinion exists over the population status of the badger (Alberta Environmental Protection, 1996).

Pronghorn Antelope

The pronghorn antelope is found on the open grasslands of southeastern Alberta. During the 1997 summer field inventory, several antelope were observed just south of the Park, which suggests that these animals may enter and inhabit the Park particulary the open grassland areas on occasion. Antelope populations tend to fluctuate as a result of variable winter and summer climatic conditions (Alberta Environmental Protection, 1996).

14.2.3.2 Amphibians and Reptiles

Canadian Toad

The Canadian Toad is a Red Listed amphibian species, which breeds in shallow portions of lakes, ponds, ditches, marshes and temporary water bodies. This toad preys on a variety of insects and other arthropods. The Canadian toad was once common in the Parkland Region, but is now experiencing a severe decline in numbers (Alberta Environmental Protection, 1996). Threats to toad populations during the past few decades include "disturbance to hibernacula, forest harvest, wetland loss and alteration, and global factors (e.g. disease, climate change) which may be responsible for broad-scale decline in amphibian populations" (Hamilton et al., 1998).

Plains Garter Snake

The plains garter snake (*Thamnophis radix*), a Yellow A Listed species, is an inhabitant of the short-grass prairie and the aspen parkland. This species can tolerate a wide range of habitats and is often found near ponds, lakes, streams and marshes where it preys upon a variety of animal species such as fish, amphibians, small mammals, worms and insects (Russell and Bauer, 1993).

14.2.3.3 Birds

A number of bird species noted as potential residents or visitors to Dillberry Lake Provincial Park and surrounding area (Macdonald and McIsaac, 1993) have been yellow listed in the province (Alberta Environmental Protection, 1996). These birds fall under the categories of shorebirds, other water dependent species, land birds and raptors. Loss of feeding and nesting habitat is a major concern for a number of these species. Dillberry Lake is stocked annually with rainbow trout (*Salmo gairdneri*) for recreational fishermen. This attracts a large number of bird species for whom fish is a major dietary component.

14.2.3.3.1 Shorebirds

Lesser Yellowlegs

Lesser Yellowlegs (*Tringa flavipes*), a Yellow A Listed species, were observed during recent shorebird surveys at Killarney and Leane Lake. Open woodlands in close proximity to open water are the preferred habitat of this species (Semenchuk, 1992). This species nests on dry ground in lightly wooded areas and utilizes the wet areas for feeding and rearing young. After the young have fledged, this species prefers large lakes where it forages along the mudflats and sandy beaches. Killarney and Leane Lake provide extensive areas of foraging habitat in close proximity to suitable nesting habitat. The disappearance of wetlands has contributed to the decline in the population of this bird. Breeding Bird Survey data indicates that this species has faced a significant decline over the last 15 years (Alberta Environmental Protection, 1996).

Willet

The willet's (*Catoptrophorus semipalmatus*) presence was recorded during recent shorebird surveys conducted at Killarney and Leane Lake (Beyersbergen, 1997). This species prefers wet meadows found along the perimeter of lakes and sloughs (Semenchuk, 1992). The extensive saline flats associated with Leane and Killarney Lake provide superb foraging habitat in close proximity to suitable nesting habitat along with wet meadows associated with the upper beach ridges. Drought and the drainage of wetlands are thought to be contributing factors to a possible decline in the population of this Yellow B Listed species (Alberta Environmental Protection, 1996).

American Avocet

The American avocet (*Recurvirostra americana*) favors the mud flats of shallow saline lakes (Semenchuk, 1992). Flies attracted to the pools of standing water on the flats provide a food source. This species tends to nest on sparsely vegetated, gravelly and sandy areas (Semenchuk, 1992), which are very prominent on the mud flats along Killarney and Leane Lake. This Yellow B Listed species is locally abundant in the

Parkland, however, its distribution has been restricted by drought and the loss of of prairie wetland habitats (Alberta Environmental Protection, 1996).

14.2.3.3.2 Water Associated Birds

American White Pelican

This species nests in colonies in the eastern half of the province. Semenchuk, (1992) reports no observations of the American white pelican (*Pelecanus erythrorhynchos*) near the Park, however, it is listed on the Alberta Watchable Wildlife bird list for the park and surrounding area. Extensive shallows along lake shorelines contain an abundance of fish and provide a favorable habitat for this species (Semenchuk, 1992). Dillberry Lake, which is annually stocked with fish, meets many of the habitat and food requirments for this species. The population of white pelicans while increasing is considered endangered and as a result this bird species has been Yellow B Listed. This is a result of the current trend of increasing numbers of nesting pairs, while the number of active colonies is decreasing (Alberta Environmental Protection, 1996).

Black-crowned Night Heron

The black-crowned night heron (*Nycticorax nycticorax*) is a Yellow B Listed species and is found primarily in the Grassland and Parkland Natural Regions. Some occurrences of this heron have been recorded in the southern portion of the Boreal Forest Natural Region (Semenchuk, 1992). The breeding population is small and relatively few colonies exist (Semenchuk, 1992). Heron numbers, however, have increased over the last two decades (Alberta Environmental Protection, 1996). Large bodies of water with dense vegetation are essential to this bird which feeds on fish, frogs, insects and vegetation of the marshy shallows (Semenchuk, 1992).

Marsh Wren

Semenchuk (1992) indicates that the marsh wren (*Cistothorus palustris*) is abundant in the marsh habitats of the Parkland Region. Drought conditions and drainage of marshland over the last decade has reduced a number of breeding areas (Alberta Environmental Protection, 1996). The marsh wren prefers nesting sites above the water among cattails (Semenchuk, 1992). The potholes in the northern end of the Park, along with the shores of Long Lake and Dillberry Lake provide abundant, suitable wetland habitat. This species has been placed on the Yellow B List in Alberta Wildlife's Status Report.

Western Grebe

This species, which is on the Yellow B List, is found in the Grassland, Parkland

and the southern edge of the Boreal Forest Natural Region (Semenchuk, 1992). The western grebe (*Aechmophorus occidentalis*) is a colonial nester that requires open water such as a lake with abundant fish as a food source. The lake must also be deep enough for diving. Nests are built in the protection of dense emergent vegetation (Alberta Environmental Protection, 1996). Dillberry Lake is annually stocked with rainbow trout, which provides a prime source of food for the western grebe in the Park.

Red-necked Grebe

The red-necked grebe (*Podiceps grisegena*) is relatively common. However, there is concern the population may be declining due to a decrease in natural parkland habitats (Alberta Environmental Protection, 1996). This Yellow A Listed species has been known to nest in the vicinity of the Dillberry Lake Provincial Park. Specific site information is lacking. Small shallow lakes, both permanent and semi-permanent and greater than two hectares provide the 50 to 60 metres of open water this bird requires for takeoff (Semenchuk, 1992). Nests are built within or near emergent vegetation, and close to water of swimming depth.

Black Tern

Breeding Bird Survey data indicates that the black tern (*Chlidonias niger*) population has declined, and this is probably attributable to habitat loss through marsh drainage and environmental contamination (Semenchuk, 1992). This Yellow A Listed species breeds in all of Alberta's natural regions, with the greatest concentration occurring in the Parkland (Semenchuk, 1992). Nests are built amongst aquatic vegetation and may be floating or secured to emergent plants. The black tern feeds primarily on dragonflies, mayflies, other insects and small fish. This species requires large marsh and wetland habitats (Alberta Environmental Protection, 1996).

Horned Grebe

The horned grebe (*Podiceps auritus*) inhabitat the Grassland, Parkland and the southern portion of the Boreal Forest Natural Region but tends to favor Parkland wetland areas (Semenchuk, 1992). This is directly related to its preference for waterbodies less than five hectares in size (Semenchuk, 1992), which are typical of the potholes of the glacial knob and kettle terrain prominent in the Parkland Region. Nests are generally floating masses, located in shallow water, which may be anchored to emergent vegetion. Breeding Bird Survey data indicates that a sharp decline in numbers has occurred during the last two decades (Alberta Environmental Protection 1996). This decline has been attributed to recent droughts, which have dried out numerous small ponds preferred by horned grebes as habitat. Alberta Environment has placed this species on the Yellow A list.

Pied-billed Grebe

This Yellow A Listed species is common in the wetlands of the Parklands and southern Boreal Regions, but may also occur in the Grasslands and the Foothills (Semenchuk, 1992). Its habitat preference includes ponds, wetlands and prairie sloughs, where it builds nests, which are floating or anchored anomgst dense emergent vegetation in shallow water (Semenchuk, 1992). Insects, fish and crustaceans form the bulk of this bird's diet. The pied-billed grebe (*Podilymbus podiceps*) has faced significant declines in population due to habitat loss caused by drought conditions over the past 20 years (Alberta Environmental Protection, 1996).

Great Blue Heron

The great blue heron (*Ardea herodias*) does not nest in the park, however, it has often been observed at Dillberry Lake which is stocked annually with rainbow trout. Fish, frogs, salamanders, water snakes, large insects, small birds and plant seeds comprise the diverse diet of this bird species (Semenchuk, 1992). This heron nests in an area northeast of the Park in Saskatchewan (Green, 1997). The current population of this Yellow B Listed species is stable, with approximately 75 colonies containing 1500 breeding pairs throughout the province (Alberta Environmental Protection, 1996).

American Bittern

The American bittern (*Botaurus lentiginosus*) is found throughout east central Alberta. It breeds in the Grassland, Parkland and southern portion of the Boreal Forest region. The Parkland Natural Region is the prime area for this Yellow A Listed species which nests in the tall, dense grasses growing in marshes, swamps, wet meadows and wet shrub communities (Semenchuk, 1992). This solitary and secretive species is carnivorous, feeding mainly on frogs, snakes, small fish and crustaceans. The American bittern was observed in the Park area during recent surveys conducted for WHSRN site nomination determination. Though locally abundant in the prairie and Parkland, drought and degradation of wetlands have further reduced the range of this species (Alberta Environmental Protection, 1996).

14.2.3.3.3 Landbirds

Sprague's Pipit

Sprague's pipit (*Anthus spragueii*) is currently on the Blue List. This landbird inhabits the Central Parkland Region and Grassland Region. It habitat preferences are shrubby grasslands, dry lake bottoms and occasional moderately grazed native pastures and grassy sites on sandhills. This bird feeds on insects while walking on the ground. The Sprague's pipit cannot tolerate heavily grazed sites, and does not prefer areas that are vegetated with non-native plant species such as agricultural lands and tame pastures. Declines in pipit population are likely the result of habitat loss. The Park has extensive areas of suitable native grasslands, shrublands and dry lake bottom habitats.

Brown Thrasher

The brown thrasher (*Toxostoma rufum*) is a common species of the Grassland, and its occurrence in the Parkland is widespread and localized (Semenchuk, 1992). This Yellow A Listed species prefers early successional vegetation as habitat, such as woodland edges and brush bordering aspen stands. Dillberry Lake Provincial Park provides an abundance of habitat favorable to this species, including low shrublands, tall shrublands and open aspen stands. The population status of this species is currently unknown, however, there are reports of decreasing numbers (Alberta Environmental Protection, 1996).

Clay-colored Sparrow

The clay-colored sparrow (*Spizella pallida*) is a Yellow A Listed species and is most common in the Parkland and Grassland (Semenchuk, 1992) Regions. The shrublands, brush openings and thickets along lakes within the Park provide ideal habitats for this "bird of field and brush" (Semenchuk, 1992). Breeding bird surveys indicate significant declines in populations. Causes for its decline currently have not been established (Alberta Environmental Protection, 1996).

Upland Sandpiper

This bird is a common resident of the Grasslands, and populations have been significantly impacted through the loss of native prairie grassland habitat (Alberta Environmental Protection, 1996; Semenchuk, 1992). Grassy uplands, wet meadows and areas with sparse tall vegetative cover provide nesting and foraging habitat for this "bird of the dry uplands" (Semenchuk, 1992). The Park provides large areas of habitat meeting the reqirements of this sandpiper. The upland sandpiper (*Bartramia longicauda*) has been designated as a Yellow A Listed species.

Western Tanager

This Yellow B Listed bird species prefers old coniferous and mixedwood forests (Alberta Environmental Protection, 1996) and occurs only in scattered areas throughout the Parkland (Semenchuk, 1992). It is therefore highly unlikely that the western tanager (*Piranga ludoviciana*) is a seasonal Park resident due to the lack of suitable habitat. The bird likely uses the Park as a stopover area during spring and fall migration.

Sharp-tailed Grouse

Several areas in the Park are utilized as dancing grounds by the sharp-tailed grouse (*Tympanuchus phasianellus*) according to Moore (1997) and Green (1997). These sites were not observed during the 1997 summer season. Sharp-tailed grouse only display their courtship ritual in the spring during the mating season. Approximate locations (Figure 4) are indicated in a previous report prepared by Renewable Resources Consulting Services Ltd. (1974). In the Parkland, this species is associated with grasslands and grain fields situated in close proximity to shrublands or open woodlands (Godfrey, 1986). The landscape and vegetation mosaic found in the Park provides the ideal habitat for this species. In much of the surrounding Parkland, agricultural activity has reduced the availability of undisturbed grass and shrubland during required the mating season.

14.2.3.3.4 Raptors

Northern Harrier (Marsh Hawk)

The northern harrier (*Circus cyaneus*) is widely distributed throughout much of the province but is most common the Grasslands and Parklands (Semenchuk, 1992). This bird of the open country hunts over marshes, moist meadows and cultivated fields adjacent to larger wetlands. Currently, concern exists over a decline in the Prairie and Parkland breeding populations, which is attributed to the decline of suitable breeding and foraging habitat (Alberta Environmental Protection, 1996). As a result of the present population status, this species has been Yellow A Listed.

Swainson's Hawk

This hawk is found in the Grassland and Parkland Natural Regions of Alberta, with the highest concentrations occurring at the Prairie - Parkland boundary (Semenchuk, 1992). The Swainson's hawk (*Buteo swainsoni*) breeds in dry open areas, nesting close to the ground in deciduous trees and shrubs. Preferred habitat is available in the Park and surrounding area. Use of suitable habitat in the Park has been corroborated by observatons of this hawk species in the area. " Sharp declines in prairie populations over the last decade" have been associated to poisoning in their winter range in South America (Alberta Environmental Protection, 1996). This Yellow A Listed species also relies on healthy populations of small mammals, particularly ground squirrels for food.

Broad-winged Hawk

The broad-winged hawk (*Buteo platypterus*) is a Yellow B Listed species and breeds in a narrow east to west band along the Boreal - Parkland Natural Region boundary (Semenchuk, 1992). Preferred nesting habitat for this species includes dense stands of mature to old trees (Semenchuk, 1992; Alberta Environmental Protection, 1996). This preferred habitat is very limited in Park, which suggests that this species is most probably an infrequent visitor to this area. While the exact status of this hawk is not known, declines have been noted in the Parkland (Alberta Environmental Protection, 1996).

Cooper's Hawk

The Cooper's hawk (*Accipiter cooperii*), has faced population declines throughout its range. Currently the highest densities occur along the Boreal - Parkland boundary (Semenchuk, 1992). While the exact status of this hawk is not known, declines have been noted in the Parkland (Alberta Environmental Protection, 1996). This Yellow B Listed species has a preference for dense woods, selecting dense cover near water for nesting sites. The elimination of aspen groves in the Parkland has resulted in the loss of important nesting habitat.

14.3 Regional Features

A number of landforms and species found in the Park are considered regionally significant and for the purposes of this report are defined as features which:

- may occur elsewhere in other Natural Regions of the province but are considered uncommon the Central Parkland Natural Subregion or
- represent a good natural example of a feature that at one time was common in the region prior to human activity or
- represent an excellent or "classic" landscape feature or
- identify areas sensitive to disturbance.

14.3.1 Landforms

Sandhills and Dune Complex

The sandhills and dune terrain complex is very prominent within the Park and creates a very unique landscape (Figure 4). The Dillberry Lake Provincial Park sandhills appears to be part of a larger sandhills and dune complex that extents west from the Manitou Sand Hills in Saskatchewan to the Wainwright Dunes in Alberta.

Spring

A spring is located on north end of Leane Lake (Renewable Resources Consulting Services Ltd., 1974) (Figure 4). Unfortunately, this site was not verified during the 1997 field season. This feature requires further investigation since plant communities associated with springs are often very unique.

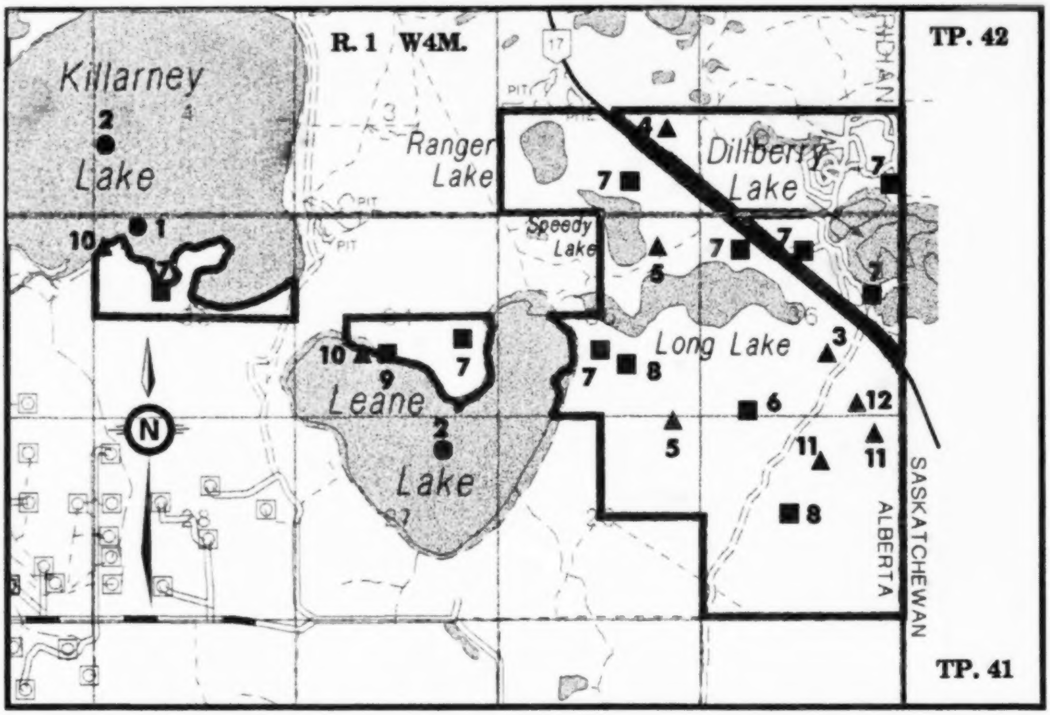
14.3.2 Flora

Poison Ivy

Poison ivy (*Rhus radicans*) is common in the uplands surrounding the lakes in the Park (Figure 4). It was observed in a variety of vegetation types ranging from depressional areas in dune field grasslands to tall shrublands and woodlands (Sites 22, 26, 45, 49, 56, 70, 83 and 90). Treed areas appeared to provide the most suitable habitat for this species. Five of of the eight sites sampled, where poison ivy occurred, were woodland communities. Overstory shrub or woodland cover slows evaporation, thereby keeping understory site conditions moist. This species was often found in microdepressions in the terrain, especially in areas where vegetative cover was minimal. These concavities act as potential catchment basins for snow and rain creating slightly moister site conditions compared to the surrounding terrain. Figure 4 displays the general vicinity of poison ivy within the park, based on 1997 field sampling and past reports. This species is known for the production of a powerful toxin, which acts a skin irritant. Moss (1983) indicates that this species is not very common within the province.

Sand Heather

A 1974 inventory conducted by Renewable Resources Consulting Services Ltd. indicated the existence of a sand heather (*Hudsonia tomentosa*) community in the sandhills portion of the southern half of the Park. The approximate location is SW quarter of Sec. 36-Twp. 41-Rge. 1-W4M (Figure 4). This occurrence was not verified during the 1997 field season. Sand heather prefers to grow on sand dune sites possessing good moisture conditions (Vance et al., 1993).


R. 1 W4M.
TP. 42
TP. 41
Killarney Lake
Ranger Lake
Dillberry Lake
Speedy Lake
Long Lake
Leane Lake
PIT
17
N
SASKATCHEWAN
ALBERTA
1
2
3
4
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8
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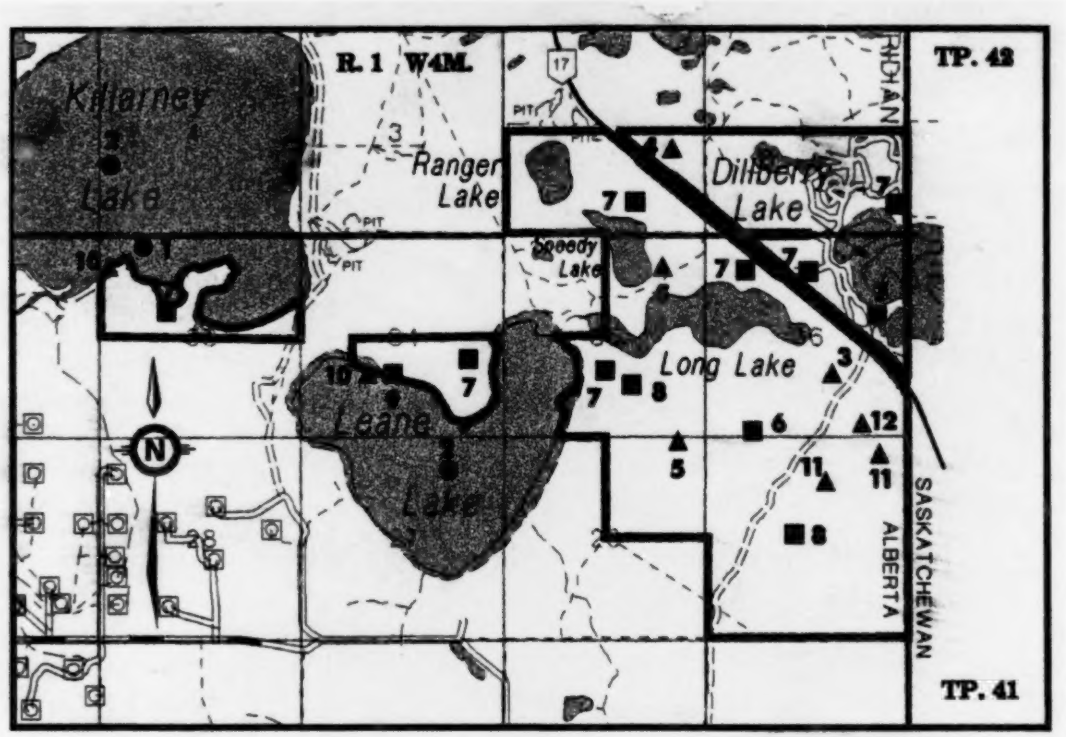
10
11
12

Significant Features	National	Provincial	Regional
1. Piping Plover Nesting Sites (Richardson, 1997)	●		
2. WHSRN site nomination (Beyersbergen, 1997) (WHSRN = Western Hemisphere Shorebird Reserve Network)	●		
3. Known Low Milkweed occurrence (1997 casual observation)		▲	
4. Known Silverleaf Psoralea occurrence (1999 biophysical inventory)		▲	
5. Sharptail Grouse Dancing Grounds (Renewable Resources Consulting Services Ltd., 1974)		▲	
6. Sand Heather community (Renewable Resources Consulting Services Ltd., 1974)			■
7. Poison Ivy Sites (1997 field observations)			■
8. Sandhills-Dune Complex			■
9. Spring (exact location not identified) (Renewable Resources Consulting Services Ltd., 1974)			■
10. Potential *Puccinnellia nuttalliana - Suaeda calceoliformis - Spregularia marina* community (1999 biophysical inventory)		▲	
11. Rough Fescue community (1999 biophysical inventory)		▲	
12. Sand Dropseed community (1999 biophysical inventory)		▲	

Figure 4. Significant Features within the Dillberry Lake Provincial Park project area.


R. 1 W4M.
TP. 42
TP. 41
17
PIT
Killarney Lake
Ranger Lake
Dillberry Lake
Speedy Lake
Long Lake
Leane Lake
N
SASKATCHEWAN
ALBERTA

Significant Features	National	Provincial	Regional
1. Piping Plover Nesting Sites (Richardson, 1997)	●		
2. WHSRN site nomination (Beyersbergen, 1997) (WHSRN = Western Hemisphere Shorebird Reserve Network)	●		
3. Known Low Milkweed occurrence (1997 casual observation)		▲	
4. Known Silverleaf Psoralea occurrence (1999 biophysical inventory)		▲	
5. Sharptail Grouse Dancing Grounds (Renewable Resources Consulting Services Ltd., 1974)		▲	
6. Sand Heather community (Renewable Resources Consulting Services Ltd., 1974)			■
7. Poison Ivy Sites (1997 field observations)			■
8. Sandhills-Dune Complex			■
9. Spring (exact location not identified) (Renewable Resources Consulting Services Ltd., 1974)			■
10. Potential *Puccinnellia nuttalliana - Suaeda calceoliformis - Spregularia marina* community (1999 biophysical inventory)		▲	
11. Rough Fescue community (1999 biophysical inventory)		▲	
12. Sand Dropseed community (1999 biophysical inventory)		▲	

Figure 4. Significant Features within the Dillberry Lake Provincial Park project area.

15. LEVEL 1 AND LEVEL 2 AREAS SUMMARY

Table 5 displays areas and percent proportion of all Level 1 Landforms and Level 2 Vegetation Type categories identified in the Park project area and represented on Maps 1 and 2 (landforms for the western and eastern portions respectively), and Maps 3 and 4 (vegetation types for the western and eastern portions respectively) in the back of the report. For the purposes of this project, the total inventoried area of the Park is calculated to be approximately 1086 hectares, which is greater than the official area of the Park of 988.229 hectares as decreed by Order in Council 339/95. Refer to Section 4.1 for details on the increased size of the project area.

Sandy Uplands represented by Level 1 Landforms E1, E2, E3, GF1, GF2, GF3, GF4 and L3 cover 921,84 hectares or 84.88% of the total project area. The second largest are Wetlands, which consist of L1, L2, L4, N1, N2 and OW landforms. Wetlands cover 162.52 hectares or 14.97% of the total project area. The smallest landform category is Non-Sandy Uplands made up of GL1 and M1 types. These only cover 1.7 hectares or 0.15% of the project area.

Table 6 lists the areas in hectares and percent cover within the confines of the project area for all Level 2 types. The most extensive Level 2 type are Woodlands (almost entirely deciduous woodlands) at 329.70 hectares or 30.35%, followed by Low and Tall Shrublands combined (319.90 hectares or 29.46%), and open Grasslands at 265.16 hectares or 24.42%. These four Level 2 classes occur predominantly on drier uplands. Wetland categories of Wet Meadows, Wet Tall Shrublands, Marsh, Floating Fen and Saline Flats make up 48.05 hectares or 4.42%. Exposed non vegetated surfaces are represented by Active Dunes and Sand Beach, and cover 5.48 hectares or 0.51% in the project area. Anthropogenic areas or lands modified or disturbed by current human activity, covers 15.24 hectares or 1.40%. It was indicated in the previous paragraph, that open water in lakes and ponds, covers 102.53 hectares or 9.44%.

Table 5: Areas and Percent Cover of Level 1 Landforms and Level 2 Vegetation Types in the Dillberry Lake Provincial Park project area

Sandy Upland - 921.84 ha; 84.88% of Total Project Area						
Level 1 (Landforms)				**Level 2 (Vegetation Types)**		
Broad Category	**Landforms**	**Area in Hectares**	**% of Total Project Area**	**Vegetation Types**	**Area in Hectares**	**% of Total Project Area**
Sandy Upland	E1	268.26	24.70	AD - Active Dunes	0.89	0.08
				G - Grasslands	70.54	6.50
				LS - Low Shrublands	44.59	4.10
				TS - Tall Shrublands	66.37	6.11
				W - Woodlands	79.05	7.28
				A - Anthropogenic	6.82	0.63
	E2	195.68	18.02	G - Grasslands	36.80	3.39
				LS - Low Shrublands	17.77	1.64
				TS - Tall Shrublands	52.54	4.84
				W - Woodlands	86.47	7.96
				A - Anthropogenic	2.10	0.19
	E3	142.58	13.14	G - Grasslands	68.37	6.30
				LS - Low Shrublands	15.34	1.41
				TS - Tall Shrublands	13.70	1.27
				W - Woodlands	43.66	4.02
				A - Anthropogenic	1.51	0.14
	GF1	175.78	16.19	G - Grasslands	58.78	5.41
				LS - Low Shrublands	38.28	3.53
				TS - Tall Shrublands	20.18	1.86
				W - Woodlands	56.55	5.21
				A - Anthropogenic	1.99	0.18
	GF2	56.28	5.18	G - Grasslands	4.45	0.41
				LS - Low Shrublands	6.19	0.57
				TS - Tall Shrublands	11.16	1.03
				W - Woodlands	34.48	3.17
	GF3	63.18	5.81	G - Grasslands	19.12	1.76
				LS - Low Shrublands	10.46	0.96
				TS - Tall Shrublands	11.43	1.05
				W- Woodlands	21.83	2.01
				A - Anthropogenic	0.34	0.03
	GF4	11.12	1.02	G - Grasslands	5.43	0.50
				LS - Low Shrublands	1.53	0.14
				TS - Tall Shrublands	0.89	0.08
				W - Woodlands	0.79	0.07
				A - Anthropogenic	2.48	0.23
	L3	8.96	0.82	LS - Low Shrublands	0.56	0.05
				TS - Tall Shrublands	1.77	0.16
				W - Woodlands	6.63	0.61

Table 5: Areas and Percent Cover of Level 1 Landforms and Level 2 Vegetation Types in the Dillberry Lake Provincial Park project area (continued)

Non Sandy Upland - 1.7 hectares; 0.15% of Total Project Area						
Level 1 (Landforms)				**Level 2 (Vegetation Types)**		
Broad Category	**Landforms**	**Area in Hectares**	**% of Total Project Area**	**Vegetation Types**	**Area in Hectares**	**% of Total Project Area**
Non Sandy Upland	GL1	0.59	0.05	LS - Low Shrublands	0.16	0.01
				TS - Tall Shrublands	0.41	0.04
				W - Woodlands	0.02	0.00 (trace)
	M1	1.11	0.10	G - Grasslands	1.11	0.10

Wetland - 162.52 hectares; 14.97% of Total Project Area						
Level 1 (Landforms)				**Level 2 (Vegetation Types)**		
Broad Category	**Landforms**	**Area in Hectares**	**% of Total Project Area**	**Vegetation Types**	**Area in Hectares**	**% of Total Project Area**
Wetland	L1	1.51	0.14	SF - Saline Flats	0.57	0.05
				WM - Wet Meadow	0.60	0.06
				WMS - Marsh	0.34	0.03
	L2	33.40	3.09	SF - Saline Flats	0.79	0.07
				G - Grasslands	0.56	0.05
				LS - Low Shrublands	3.34	0.31
				TS - Tall Shrublands	3.23	0.30
				W - Woodlands	0.22	0.02
				WM - Wet Meadows	11.97	1.11
				WMS - Marsh	8.70	0.80
				SB - Sand Beach	4.59	0.43
	L4	6.66	0.61	WMS - Marsh	6.66	0.61
	N1	16.12	1.48	TSW - Wet Tall Shrublands	3.28	0.30
				WM - Wet Meadows	7.04	0.65
				WMS - Marsh	5.80	0.53
	N2	2.30	0.21	FF - Floating Fen	1.87	0.17
				TSW - Wet Tall Shrublands	0.43	0.04
	OW	102.53	9.44	OW - Open Water	102.53	9.44

Grand Total	1086.06	100.00

Table 6: Total Areas and Percent Cover of Level 2 Vegetation Types in the Dillberry Lake Provincial Park project area

Level 2 Vegetation Types	Area in Hectares	% of Total Park Area
G - Grassland	265.16	24.42
LS - Low Shrubland	138.22	12.72
TS - Tall Shrubland	181.68	16.74
W - Woodland	329.70	30.35
TSW - Wet Tall Shrubland	3.71	0.34
WM - Wet Meadow	19.61	1.82
WMS - Marsh	21.50	1.97
FF - Floating Fen	1.87	0.17
AD - Active Dune	0.89	0.08
SF - Saline Flats	1.36	0.12
SB - Sand Beach	4.59	0.43
OW - Open Water	102.53	9.44
A - Anthropogenic	15.24	1.40
TOTAL	1086.06	100.00

16. CONCLUSION

This report provides a comprehensive description of the landscapes and vegetation present in Dillberry Lake Provincial Park. The landforms in the Park area are predominantly glaciofluvial in origin, with more recent eolian activity having occurred in the southern part of the Park. This recent eolian activity has resulted in the formation of the dune fields, which have since been stabilized by upland vegetation communities. The overall topography of the glaciofluvial and eolian uplands is hummocky to ridged in the higher elevations to undulating in the lower terrain. Level to undulating lacustrine deposits in the form of exposed and submerged lake bottom sediments and beach terraces are prevalent around lakes and ponds. Level organic deposits also occur in lowlying areas around large lakes, and in small local kettle depressions in the glaciofluvial terrain. Very small areas of level to undulating morainal and glaciolacustrine deposits occur in the area south of Killarney Lake in the southwest corner of the project area. Open water is evident in lakes and small depressional ponds within the Park.

A number of physiognomic vegetation types are associated with landform features found in the Park. The dry uplands are vegetated with a mosaic of grassland, tall and low shrubland and woodland plant communities. These uplands are very homogeneous in terms of the parent material, which is predominantly coarse textured glaciofluvial and eolian deposits. Local site factors such as slope angle, slope aspect and slope position, affect the distribution and development of upland plant communities. Vegetation types and their associated plant communities in low-lying areas near lakes and smaller pothole depressions have developed because of their proximity to high water tables. The high moisture conditions in these lowland sites are conducive to the establishment of wetlands such as marshes and wet meadows.

The Park represents a remnant of natural parkland left in east central Alberta, and provides critical habitat to numerous plant and animal species, many of which have been identified and discussed in this report.

16.1 Suggested Topics for Further Study

Suggestions for further study and inventory are as follows:

- conduct vegetation field surveys earlier in the year to observe and document spring and early summer vascular flora.
- conduct detailed surveys of non-vascular plants such as mosses, lichens and liverworts over the course of a growing season.

- conduct detailed surveys of vertebrates (mammals, birds, amphibians and reptiles), and invertebrates (insects, spiders, etc.) including habitat requirements to complete the record of biological resources in the Park.

- verification of the occurrence, location and extent of the sand heather community.

- verification of the spring location at the north end of Leane Lake.

- verification of the occurrence and location of various bluegrass graminoid species (*Poa* spp.), and locate more grasslands consisting of plains rough fescue (*Festuca hallii).*

- woodlands should be further defined on the basis of crown canopy to obtain a better understanding of why aspen stand breakup is occurring. Degree of openess of woodlands may further distinquish additional vegetation communities.

- a rare plant study should be considered if further information regarding rare vascular and non-vascular plant species is required. A number of potential sites for rare plant habitats exist, particularly active dune sites, grasslands and a spring area.

- conduct a detailed hydrographic survey to determine the water flow dynamics and the mineral composition of wetlands, including lakes and ponds.

- a diverse range of songbirds (passerines) and other bird species occur in the Park. Detailed bird surveys would verify the presence of any significant species. The WHSRN project has concentrated on shorebirds in the area. More detailed information regarding the shorebird surveys should be available in the near future.

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Appendix 1. 1997 Field Site Descriptions (Site Characteristics, Vegetation Types and Communities, and Landforms)

Refer to Appendix 5 for key to Slope Aspect, Meso Site Position, Ecological Moisture Regime, Drainage, Nutrient Regime, Soil Subgroup, Level 1 Landform Type and Terrain Surface Expression classes and codes.

Sam -ple Site	Slope Aspect	Slope %	Meso Site Position Class	Ecological Moisture Regime Class	Drain -age Class	Nutrient Regime Class	Soil Subgroup	Level 2 Vegetation Type with extra detail	Level 3 Vegetation Community	Level 1 Landform Type	Terrain Surface Expres- sion
40a	none	0	7	8	6	6	R.G(saline)	saline flats	non-vegetated	L1	l
89	E	3	5	2	2	2	O.R	blowout (active dune)	Sand Grass - Sand Dropseed - June Grass - Blunt Sedge	E1	u
34	SW	15	5	1	2	1	O.R	blowout (active dune)	Sand Grass - Sand Dropseed - June Grass - Blunt Sedge	E1	iu
25a	W	42	4	1	1	1	O.R	blowout (active dune)	Sand Grass - Sand Dropseed - June Grass - Blunt Sedge	E1	sE
23	none	0	7	8	6	6	R.G	deepmarsh-min	Great Bulrush / Liverworts	L2	l
64	none	0	6	8	6	5	TY.H	deepmarsh-org	Great Bulrush	N1	el
88	none	0	7	8	6	6	T.H	deepmarsh-org	Great Bulrush	N1	el
12	S	3	3	2	2	2	O.R	dwarfshrubland	Common Bearberry	E3	iu
77	E	15	2	2	2	2	O.DB	dwarfshrubland	Creeping Juniper	GF1	h
32	E	4	3	2	2	2	O.DB	dwarfshrubland	Creeping Juniper	E3	u
78	E	6	5	2	2	2	O.DB	dwarfshrubland	Creeping Juniper	GF3	iu
30	NW	4	1	2	2	2	O.DB	dwarfshrubland	Creeping Juniper	E2	hu
36	S	10	2	2	2	2	O.DB	dwarfshrubland	Creeping Juniper	E2	iu
65	S	10	2	2	2	2	O.DB	dwarfshrubland	Creeping Juniper	GF1	iu
5	S	21	2	2	1	2	O.R	dwarfshrubland	Creeping Juniper	E1	iu
21	SW	8	2	2	2	2	O.R	dwarfshrubland	Creeping Juniper	E1	iu
67	SW	15	2	2	2	2	O.DB	dwarfshrubland	Creeping Juniper	GF1	iu
28	SW	18	3	2	2	2	O.R	dwarfshrubland	Creeping Juniper	E1	i
71	W	13	3	2	2	2	O.DB	dwarfshrubland	Creeping Juniper	GF1	i
84	none	0	7	9	7	5	HY.H	floatingfen	Dwarf Birch / Water Sedge / Brown Moss	N2	l
17	N	11	4	3	2	2	O.DB	grassland	Crested Wheat Grass - Western Wheat Grass (Disturbance Community)	E3	iu
19	W	8	3	3	3	2	O.DB	grassland	Crested Wheat Grass - Western Wheat Grass (Disturbance Community)	E3	up
55	N	3	2	2	2	2	O.DB	grassland	Needle and Thread Grass - June Grass - Slender Wheat Grass - Blunt Sedge	GF1	iu
46	S	8	2	2	2	2	O.DB	grassland	Needle and Thread Grass - June Grass - Slender Wheat Grass - Blunt Sedge	GF1	i
44	S	10	2	2	2	2	O.DB	grassland	Needle and Thread Grass - June Grass - Slender Wheat Grass - Blunt Sedge	GF1	i
54	SW	5	2	2	2	2	O.DB	grassland	Needle and Thread Grass - June Grass - Slender Wheat Grass - Blunt Sedge	GF1	iu
48	SW	14	2	2	2	2	O.DB	grassland	Needle and Thread Grass - June Grass - Slender Wheat Grass - Blunt Sedge	GF1	i
13	S	5	5	2	2	2	O.R	grassland	Western Porcupine Grass - June Grass - Slender Wheat Grass / Reindeer Lichen	E1	i
9	S	2	7	3	2	2	O.DB	grassland	Western Porcupine Grass - June Grass - Slender Wheat Grass / Reindeer Lichen	E3	lu
4a	SE	5	3	2	2	2	CU.R-O.R	grassland	Western Porcupine Grass - June Grass - Slender Wheat Grass / Reindeer Lichen	E1	up
43	S	3	6	6	5	3	GLSZ.BL	grassland	Needle Grass - Sandberg Bluegrass - Blunt Sedge	M1	lue
22	S	11	2	3	2	2	O.DB	grassland	Needle Grass - June Grass - Wheat Grass	E3	u
1	S	3	3	3	2	2	O.DB	grassland	Needle Grass - June Grass - Wheat Grass	E1	hr
29	SW	2	2	3	2	2	O.DB	grassland	Needle Grass - June Grass - Wheat Grass	E2	u
66	SW	20	2	1	1	2	R.DB	grassland	Pasture Sagewort / June Grass - Blunt Sedge	GF2	hi
37	W	3	2	2	2	2	O.DB	grassland	Pasture Sagewort / June Grass - Blunt Sedge	GF4	u
75	S	7	3	2	2	2	O.DB	lowshrubland	Aspen Shrub / Creeping Juniper	GF3	u
73	NE	5	3	2	2	2	R.DB	lowshrubland	Buckbrush	GF3	u

Appendix 1. 1997 Field Site Descriptions (Site Characteristics, Vegetation Types and Communities, and Landforms)

Refer to Appendix 5 for key to Slope Aspect, Meso Site Position, Ecological Moisture Regime, Drainage, Nutrient Regime, Soil Subgroup, Level 1 Landform Type and Terrain Surface Expression classes and codes.

Sam -ple Site	Slope Aspect	Slope %	Meso Site Position Class	Ecological Moisture Regime Class	Drain -age Class	Nutrient Regime Class	Soil Subgroup	Level 2 Vegetation Type with extra detail	Level 3 Vegetation Community	Level 1 Landform Type	Terrain Surface Expres- sion
39	SW	3	2	2	2	2	O.DB	lowshrubland	Buckbrush	GF1	i
47	W	12	2	3	2	2	R.DB	lowshrubland	Rose	GF1	i
69	SW	8	3	3	2	2	O.DB	lowshrubland	Silverberry Shrubland	GF1	iu
81	N	7	3	3	2	2	O.R	lowshrubmeadow	Silverberry Meadow	L2	tiu
41	SE	4	2	6	5	3	GL.R	lowshrubmeadow	Silverberry Meadow	L2	tlu
40b	E	1	7	7	5	6	GL.R	shallowmarsh-min	Three-square Rush - Foxtail Barley - Nuttall's Salt-meadow Grass	L1	lu
52	none	0	7	7	6	6	R.G	shallowmarsh-min	Three-square Rush - Foxtail Barley - Nuttall's Salt-meadow Grass	L1	l
57	none	0	7	8	6	6	R.G	shallowmarsh-min	Three-square Rush - Foxtail Barley - Nuttall's Salt-meadow Grass	L2	l
86	N	3	2	3	2	2	O.DB	tallshrubland	Aspen Shrub - Saskatoon - Choke Cherry / Buckbrush	E2	u
72	N	8	3	3	2	2	O.DB	tallshrubland	Aspen Shrub - Saskatoon - Choke Cherry / Buckbrush	GF1	u
31	N	9	3	2	2	2	O.DB	tallshrubland	Aspen Shrub - Saskatoon - Choke Cherry / Buckbrush	E2	i
27	N	25	3	3	2	2	O.R	tallshrubland	Aspen Shrub - Saskatoon - Choke Cherry / Buckbrush	E1	i
8	S	10	1	3	2	2	O.DB	tallshrubland	Aspen Shrub - Saskatoon - Choke Cherry / Buckbrush	E2	kr
70	SE	8	3	3	2	2	O.DB	tallshrubland	Aspen Shrub - Saskatoon - Choke Cherry / Buckbrush	GF2	i
15	SE	27	3	3	2	2	O.DB	tallshrubland	Aspen Shrub - Saskatoon - Choke Cherry / Buckbrush	E2	iu
26	NE	50	2	4	2	3	R.DB	tallshrubland	Aspen Shrub - Saskatoon - Choke Cherry / Rose	E1	s
20	NE	52	2	4	2	2	CU.R	tallshrubland	Aspen Shrub - Saskatoon - Choke Cherry / Rose	E1	s
42	NW	42	3	4	2	2	O.R	tallshrubland	Aspen Shrub - Saskatoon - Choke Cherry / Rose	GF1	s
58	S	4	2	3	2	2	O.DB	tallshrubland	Aspen Shrub / Creeping Juniper / Reindeer Lichen	GF1	i
11	S	7	3	2	2	2	O.DB	tallshrubland	Aspen Shrub / Creeping Juniper / Reindeer Lichen	E3	ur
79	N	13	2	4	3	4	O.DB	tallshrubland	Caragana - Smooth Brome	GF1	i
85	SW	4	5	8	6	5	T.F/R.G(peaty)	tallshrubland-wet	Red-osier Dogwood - Willow	N2	i
61	N	6	4	5	3	3	O.R	wetmeadow-min	Northern Reed Grass - Wire Rush	L2	tiu
51	SW	1	5	7	6	4	R.G	wetmeadow-min	Northern Reed Grass - Wire Rush	L2	tlu
80	N	2	5	6	3	4	O.R	wetmeadow-min	Sow-thistle / Three-square Rush - Foxtail Barley	L2	lu
60	N	2	7	8	6	6	R.G(saline)	wetmeadow-min	Sow-thistle / Three-square Rush - Foxtail Barley	L1	lu
64a								wetmeadow-org	Sow-thistle - Canada Golden Rod / Northern Reed Grass - Spangletop	N1	
74	none	0	7	8	6	5	TY.H	wetmeadow-org	Sow-thistle - Canada Golden Rod / Northern Reed Grass - Spangletop	N1	el
76	none	0	7	8	6	6	TY.H	wetmeadow-org	Sow-thistle - Canada Golden Rod / Northern Reed Grass - Spangletop	N1	el
83	S	7	2	3	2	2	O.DB	woodland	Aspen/Aspen Regrowth -Saskatoon-Choke Cherry/Buckbrush	E1	iu
62	SE	6	3	3	2	2	O.DB	woodland	Aspen/Aspen Regrowth -Saskatoon-Choke Cherry/Buckbrush	GF2	i
2	SE	10	3	3	2	2	O.DB	woodland	Aspen/Aspen Regrowth -Saskatoon-Choke Cherry/Buckbrush	E1	h
68	SW	4	3	3	2	2	O.DB	woodland	Aspen/Aspen Regrowth -Saskatoon-Choke Cherry/Buckbrush	GF3	iu
90	E	8	2	3	2	2	R.DB	woodland	Aspen / Aspen Shrub - Saskatoon -Choke Cherry / Creeping Juniper - Bearberry	E1	ir
87	NE	13	5	3	2	2	R.DB	woodland	Aspen / Aspen Shrub - Saskatoon -Choke Cherry / Creeping Juniper - Bearberry	E3	ru
59	S	8	2	3	2	2	O.DB	woodland	Aspen / Aspen Shrub - Saskatoon -Choke Cherry / Creeping Juniper - Bearberry	GF1	i
35	N	15	3	3	2	2	O.DB	woodland	Aspen / Aspen Shrub - Saskatoon - Choke Cherry / Rose (Raspberry)	E2	iu
33	N	75	3	4	1	3	R.DB	woodland	Aspen / Aspen Shrub - Saskatoon - Choke Cherry / Rose (Raspberry)	E1	s
3	NE	10	2	4	3	3	O.DB	woodland	Aspen / Aspen Shrub - Saskatoon - Choke Cherry / Rose (Raspberry)	E2	hr
82	NE	7	4	4	3	3	O.DB	woodland	Aspen / Aspen Shrub - Saskatoon - Choke Cherry / Rose (Raspberry)	GF1	i
63	NE	17	4	4	2	3	CU.R	woodland	Aspen / Aspen Shrub - Saskatoon - Choke Cherry / Rose (Raspberry)	GF2	iF
14	S	2	1	4	2	2	O.DB	woodland	Aspen / Aspen Shrub - Saskatoon - Choke Cherry / Rose (Raspberry)	E2	u
56	SE	8	3	5	5	3	GL.HR	woodland	Aspen / Aspen Shrub - Saskatoon - Choke Cherry / Rose (Raspberry)	L3	i
49	NW	60	3	4	2	4	O.DB	woodland	Aspen / Aspen Shrub - Saskatoon - Choke Cherry / Rose (Raspberry)	GF2	i

Appendix 1. 1997 Field Site Descriptions (Site Characteristics, Vegetation Types and Communities, and Landforms)

Refer to Appendix 5 for key to Slope Aspect, Meso Site Position, Ecological Moisture Regime, Drainage, Nutrient Regime, Soil Subgroup, Level 1 Landform Type and Terrain Surface Expression classes and codes.

Sam-ple Site	Slope Aspect	Slope %	Meso Site Position Class	Ecological Moisture Regime Class	Drain-age Class	Nutrient Regime Class	Soil Subgroup	Level 2 Vegetation Type with extra detail	Level 3 Vegetation Community	Level 1 Landform Type	Terrain Surface Expres-sion
10	SW	2	7	4	2	2	O.DB	woodland	Aspen / Aspen Shrub - Saskatoon - Choke Cherry / Rose (Raspberry)	E1	lu
53	N	6	3	3	2	2	O.DB	woodland	Aspen / Rose - Buckbrush	GF1	u
16	N	25	3	4	2	2	O.DB	woodland	Aspen / Rose - Buckbrush	E2	i
6	N	35	3	2	2	2	O.R-R.DB	woodland	Aspen / Rose - Buckbrush	E1	i
18	SW	15	2	3	2	2	O.DB	woodland	Aspen / Rose - Buckbrush	E2	i
7	SW	4	7	3	2	2	O.DB	woodland	Aspen / Rose - Buckbrush	E1	u
38	N	6	3	6	4	4	O.BL	woodland	Aspen / Rose - Buckbrush	GL1	u
45	NW	5	7	6	5	4	GLCU.R	woodland	Aspen / Rose - Buckbrush	GF1	lu
50	SW	8	4	7	6	4	R.G	woodland-wet	Balsam poplar / Willow (Water Birch)	L2	lu
24	W	4	2	6	5	4	GL.R	woodland-wet	Balsam poplar / Willow (Water Birch)	L3	lu
4b	SE	6	5	3	2	2	O.DB			E1	up
25b	W	16	2	2	2	3	O.R			E1	iu

Appendix 2 - Birds of Dillberry Lake Provincial Park

(from the Alberta Watchable Wildlife Checklist compiled by Macdonald and McIsaac, 1993)

Loon, Grebes
- Common Loon
- Pied-billed Grebe
- Horned Grebe
- Red-necked Grebe
- Eared Grebe
- Western Grebe

Pelicans, Herons, Allies
- American White Pelican
- American Bittern
- Great Blue Heron
- Black-crowned Night Heron

Waterfowl
- Trundra Swan
- Greater White-fronted Goose
- Snow Goose
- Snow (Blue) Goose
- Ross' Goose
- Canada Goose
- Green-winged Teal
- Mallard
- Northern Pintail
- Blue-winged Teal
- Cinnamon Teal
- Northern Shoveler
- Gadwall
- American Wigeon
- Canvasback
- Redhead
- Ring-necked Duck
- Greater Scaup
- Lesser Scaup
- White-winged Scoter
- Common Goldeneye
- Bufflehead
- Common Merganser
- Red-breasted Merganser
- Ruddy Duck

Hawks, Falcons, Allies
- Turkey Vulture
- Osprey
- Bald Eagle
- Northern Harrier
- Sharp-shinned Hawk
- Cooper's Hawk

Hawks, Falcons, Allies cont'd
- Northern Goshawk
- Broad-winged Hawk
- Swainson's Hawk
- Red-tailed Hawk
- Red-tailed (Harlan's) Hawk
- Ferruginous Hawk
- Rough-legged Hawk
- American Kestrel
- Merlin
- Peregrine Falcon
- Gyrfalcon

Pheasants, Grouse, Allies
- Gray Partridge
- Ruffed Grouse
- Greater Prairie-chicken
- Sharp-tailed Grouse

Rails, Cranes
- Yellow Rail
- Virginia Rail
- Sora
- American Coot
- Sandhill Crane

Shorebirds
- Black-bellied Plover
- Lesser Golden-plover
- Semipalmated Plover
- Piping Plover
- Killdeer
- American Avocet
- Greater Yellowlegs
- Lesser Yellowlegs
- Solitary Sandpiper
- Willet
- Spotted Sandpiper
- Long-billed Curlew
- Hudsonian Godwit
- Marbled Godwit
- Ruddy Turnstone
- Red Knot
- Sanderling
- Semipalmated Sandpiper
- Western Sandpiper
- Least Sandpiper
- White-rumped Sandpiper

Shorebirds cont'd
- Baird's Sandpiper
- Pectoral Sandpiper
- Dunlin
- Stilt Sandpiper
- Short-billed Dowitcher
- Long-billed Dowitcher
- Common Snipe
- Wilson's Pharalope
- Red-necked Pharalope

Gulls, Terns, Allies
- Franklin's Gull
- Bonaparte's Gull
- Ring-billed Gull
- California Gull
- Herring Gull

Gulls, Terns, Allies cont'd
- Common Tern
- Forster's Tern
- Black Tern

Doves, Cuckoos
- Rock Dove
- Mourning Dove

Owls
- Great Horned Owl
- Snowy Owl
- Long-eared Owl
- Short-eared Owl
- Northern Saw-whet Owl

Nighthawks to Kingfishers
- Common Nighthawk
- Ruby-throated Hummingbird
- Belted Kingfisher

Woodpeckers
- Yellow-bellied Sapsucker
- Downy Woodpecker
- Hairy Woodpecker
- Northern (yellow-shafted) Flicker
- Northern (red-shafted) Flicker

Flycatchers
- Olive-sided Flycatcher
- Western Wood Peewee
- Yellow-bellied Flycatcher
- Alder Flycatcher
- Least Flycatcher
- Eastern Phoebe
- Western Kingbird

Flycatchers cont'd
- Eastern Kingbird

Larks, Swallows
- Horned Lark
- Tree Swallow
- Bank Swallow
- Cliff Swallow
- Barn Swallow

Jay, Crows, Allies
- Blue Jay
- Black-billed Magpie

Jays, Crows, Allies cont'd
- American Crow
- Common Raven

Chickadees to Dippers
- Black-capped Chickadee
- Red-breasted Nuthatch
- White-breasted Nuthatch
- Rock Wren
- House Wren
- Marsh Wren

Kinglets to Thrashers
- Golden-crowned Kinglet
- Ruby-crowned Kinglet
- Mountain Bluebird
- Veery
- Gray-cheeked Thrush
- Swainson's Thrush
- Hermit Thrush
- American Robin
- Gray Catbird
- Brown Thrasher

Pipits to Starlings
- American Pipit
- Sprague's Pipit
- Bohemian Waxwing
- Cedar Waxwing
- Northern Shrike
- Loggerhead Shrike
- European Starling

Vireos, Warblers
- Solitary Vireo
- Warbling Vireo
- Philadelphia Vireo
- Red-eyed Vireo
- Tennessee Warbler
- Orange-crowned Warbler
- Yellow Warbler

Vireos, Warblers cont'd

Magnolia Warbler
Yellow-rumped (Myrtle) Warbler
Palm Warbler
Blackpoll Warbler
Black-and-White Warbler
American Redstart
Ovenbird
Northern Waterthrush
Connecticut Warbler
Mourning Warbler
Common Yellowthroat
Wilson's Warbler
Canada Warbler

Tanagers, Cardinals, Allies

Western Tanager
Rose-breasted Grosbeak

Sparrows, Allies

Rufous-sided Towhee
Amercian Tree Sparrow
Chipping Sparrow
Clay-colored Sparrow
Vesper Sparrow
Lark Bunting
Savannah Sparrow
Baird's Sparrow
Le Conte's Sparrow
Sharp-tailed Sparrow
Fox Sparrow
Song Sparrow
Lincoln's Sparrow
Swamp Sparrow
White-throated Sparrow
White-crowned Sparrow
Harris' Sparrow
Dark-eyed (Slate-colored) Junco
Lapland Longspur
Smith's Longspur
Chestnut-collared Longspur
Snow Bunting

Blackbirds, Allies

Bobolink
Red-winged Blackbird
Western Meadowlark
Yellow-headed Blackbird
Rusty Blackbird
Brewer's Blackbird
Common Grackle
Brown-headed Cowbird
Northern (Baltimore) Oriole

Finches, Allies

Pine Grosbeak
Purple Finch
White-winged Crossbill
Common Redpoll
Hoary Redpoll
Pine Siskin
American Goldfinch
Evening Grosbeak
House Sparrow

Appendix 3 - List of Mammals potentially occurring in Dillberry Lake Provincial Park

(based on Smith, 1993)

Shrews (Order Insectivora)

Masked Shrew	(*Sorex cinereus*)
Prairie Shrew	(*Sorex haydeni*)
Dusky Shrew	(*Sorex monticolus*)
Water Shrew	(*Sorex palustris*)
Arctic Shrew	(*Sorex arcticus*)

Bats (Order Chiroptera)

Little Brown Bat	(*Myotis lucifugus*)
Silver-haired Bat	(*Lasionycteris noctivagans*)
Big Brown Bat	(*Eptesicus fuscus*)
Hoary Bat	(*Lasiurus cinereus*)

Pika, Hares, and Rabbits (Order Lagomorpha)

Showshoe Hare	(*Lepus americanus*)
White-tailed Jack Rabbit	(*Lepus townsendii*)

Rodents (Order Rodentia)

Least Chipmunk	(*Tamias minimus*)
Richardson's Ground Squirrel	(*Spermophilus richardsonii*)
Thirteen-lined Ground Squirrel	(*Spermophilus tridecemlineatus*)
Northern Pocket Gopher	(*Thomomys talpoides*)
Beaver	(*Castor canadensis*)
Deer Mouse	(*Peromyscus maniculatus*)
Southern Red-backed Vole	(*Clethrionomys gapperi*)
Meadow Vole	(*Microtus pennsylvanicus*)
Prairie Vole	(*Microtus ochrogaster*)
Muskrat	(*Ondatra zibethicus*)
Western Jumping Mouse	(*Zapus princeps*)
Porcupine	(*Erethizon dorsatum*)

Appendix 3 continued.......

Carnivores (Order Carnivora)

Red Fox	(*Vulpes vulpes*)
Ermine	(*Mustela erminea*)
Least Weasel	(*Mustela nivalis*)
Long-tailed Weasel	(*Mustela frenata*)
Mink	(*Mustela vison*)
Badger	(*Taxidea taxus*)
Striped Skunk	(*Mephitis mephitis*)

Ungulates (Order Artiodactyla)

Mule Deer	(*Odocoileus hermionus*)
White-tailed Deer	(*Odocoileus virginianus*)
Pronghorn Antelope	(*Antilocapra americana*)

Appendix 4 – Dillberry Lake Provincial Park Plant Species List

Note: This is not an exhaustive list. Instead it represents plant species observed at sample sites and traverses to the sites during late July and early August of 1997.

Form categories: grasses, rushes and sedges = s; forbs and ferns = f; l = lichens; shrubs = s; trees = t

Code	Form	Scientific Name	Common Name
ACHIMIL	f	*Achillea millefolium*	common yarrow
ACTARUB	f	*Actaea rubra*	red and white baneberry
AGRODAS	g	*Agropyron dasystachyum*	northern wheat grass
AGROSCA	g	*Agrostis scabra*	rough hair grass
AGROPEC	g	*Agropyron pectiniforme*	crested wheat grass
AGROSMI	g	*Agropyron smithii*	western wheat grass
AGROTRA	g	*Agropyron trachycaulum*	slender wheat grass
AMEL ALN	s	*Amelanchier alnifolia*	saskatoon
ANEMCYL	f	*Anemone cylindrica*	long-fruited anemone
ANEMPAT	f	*Anemone patens*	prairie crocus
ANTEPAR	f	*Antennaria parvifolia*	small-leaved everlasting
APOCAND	f	*Apocynum androsaemifolium*	spreading dogbane
ARABDIV	f	*Arabis divaricarpa*	purple rock cress
ARALNUD	f	*Aralia nudicaulis*	wild sarsaparilla
ARCTUVA	s	*Arctostaphylos uva-ursi*	common bearberry
ARTECAM	f	*Artemisia campestris*	plains wormwood
ARTEFRI	f	*Artemisia frigida*	pasture sagewort
ARTELUD	f	*Artemisia ludoviciana*	prairie sagewort
ASCLOVA	f	*Asclepias ovalifolia*	low milkweed
ASTEBOR	f	*Aster borealis*	marsh aster
ASTECIL	f	*Aster ciliolatus*	Lindley's aster
ASTEERI	f	*Aster ericoides*	tufted white prairie aster
ASTEHES	f	*Aster hesperius*	western willow aster
ASTELAE	f	*Aster laevis*	smooth aster
ASTRDRU	f	*Astragalus drummondii*	Drummond's milk vetch
ASTRSPP	f	*Astragalus* spp.	milk vetch
AXYRAMA	f	*Axyris amaranthoides*	Russian pigweed
BETUOCC	t	*Betula occidentalis*	water birch
BETUPUM	s	*Betula pumila*	dwarf birch
BOUTGRA	g	*Bouteloua gracilis*	blue grama
BROMCIL	g	*Bromus ciliatus*	fringed brome
BROMINE	g	*Bromus inermis*	smooth brome
CALACAN	g	*Calamagrostis canadensis*	bluejoint
CALAINE	g	*Calamagrostis inexpansa*	northern reed grass
CALALON	g	*Calamovilfa longifolia*	sand grass
CAMPROT	f	*Campanula rotundifolia*	harebell
CARAARB	s	*Caragana arborescens*	common caragana
CAREAQU	g	*Carex aquatilis*	water sedge
CARELAN	g	*Carex lanuginosa*	woolly sedge
CAREOBT	g	*Carex obtusata*	blunt sedge
CAREPRG	g	*Carex praegracilis*	graceful sedge
CARESIC	g	*Carex siccata*	hay sedge
CARESPP	g	*Carex* spp.	sedge
CARESPR	g	*Carex sprengelii*	Sprengel's sedge
CERAARV	f	*Cerastium arvense*	field mouse-ear chickweed
CHENALB	f	*Chenopodium album*	lamb's quarters
CHENSAL	f	*Chenopodium salinum*	oak-leaved goosefoot
CHRYNAU	s	*Chrysothamnus nauseosus*	rabbitbrush
CIRSARV	f	*Cirsium arvense*	Canada thistle
CLADMIT	l	*Cladina mitis*	yellow reindeer lichen
COELSPP	l	*Coelocaulon* spp.	lichen
COMAUMB	f	*Comandra umbellata*	bastard toadflax
CORYAUR	f	*Corydalis aurea*	golden corydalis
CORNSTO	s	*Cornus stolonifera*	red-osier dogwood

Code	Form	Scientific Name	Common Name
CRATROT	s	*Crataegus rotundifolia*	round-leaved hawthorn
CREPTEC	f	*Crepis tectorum*	annual hawk's-beard
DESCCAE	g	*Deschampsia cespitosa*	tufted hair grass
DESCSOP	f	*Descurainia sophia*	flixweed
DISPTRA	f	*Disporum trachycarpum*	fairybells
DISTSTR	g	*Distichlis stricta*	salt grass
DREPSPP	m	*Drepanocladus* spp.	brown moss
ELAECOM	s	*Elaeagnus commutata*	silverberry
ELYMCAN	g	*Elymus canadensis*	Canada wild rye
EPILANG	f	*Epilobium angustifolium*	common fireweed
EPILCIL	f	*Epilobium ciliatum*	northern willowherb
EQUIARV	f	*Equisetum arvense*	common horsetail
EQUIHYE	f	*Equisetum hyemale*	common scouring-rush
EQUISYL	f	*Equisetum sylvaticum*	woodland horsetail
ERIGCAE	f	*Erigeron caespitosus*	tufted fleabane
ERIGCAN	f	*Erigeron canadensis*	horseweed
ERIGGLA	f	*Erigeron glabellus*	smooth fleabane
EUROLAN	f	*Eurotia lanata*	winter-fat
FESTHAL	g	*Festuca hallii*	plains rough fescue
FESTSAX	g	*Festuca saximontana*	Rocky Mountain fescue
FRAGVIR	f	*Fragaria virginiana*	wild strawberry
GAILARI	f	*Gaillardia aristata*	gaillardia
GALETET	f	*Galeopsis tetrahit*	hemp-nettle
GALIBOR	f	*Galium boreale*	northern bedstraw
GALITRI	f	*Galium triflorum*	sweet-scented bedstraw
GEUMALE	f	*Geum aleppicum*	yellow avens
GEUMTRI	f	*Geum triflorum*	three-flowered avens
GLYCLEP	f	*Glycyrrhiza lepidota*	wild licorice
GRINSQU	f	*Grindelia squarrosa*	gumweed
GUTISAR	f	*Gutierrezia sarothrae*	broomweed
HABEVIR	f	*Habenaria viridis*	bracted bog orchid
HELIHOO	g	*Heliotrichon hookeri*	Hooker's oat grass
HETEVIL	f	*Heterotheca villosa*	golden aster
HEUCRIC	f	*Heuchera richardsonii*	Richardson's alumroot
HIERUMB	f	*Hieracium umbellatum*	narrow-leaved hawkweed
HORDJUB	g	*Hordeum jubatum*	foxtail barley
HYOSNIG	f	*Hyoscyamus niger*	black henbane
JUNCBAL	g	*Juncus balticus*	wire rush
JUNICOM	s	*Juniperus communis*	ground juniper
JUNIHOR	s	*Juniperus horizontalis*	creeping juniper
KOELMAC	g	*Koeleria macrantha*	June grass
LACTPUL	f	*Lactuca pulchella*	common blue lettuce
LAPPSQU	f	*Lappula squarrosa*	bluebur
LATHOCH	f	*Lathyrus ochroleucus*	cream-colored vetchling
LATHVEN	f	*Lathyrus venosus*	purple peavine
LEPIDEN	f	*Lepidium densiflorum*	common pepper-grass
LILIPHI	f	*Lilium philadelphicum*	western wood lily
LONIDIO	s	*Lonicera dioica*	twining honeysuckle
LYGOJUN	f	*Lygodesmia juncea*	skeletonweed
MAIACAN	f	*Maianthemum canadense*	wild lily-of-the-valley
MELIALB	f	*Melilotus alba*	white sweet-clover
MELIOFF	f	*Melilotus officinalis*	yellow sweet-clover
MENTARV	f	*Mentha arvensis*	wild mint
MIRAHIR	f	*Mirabilis hirsuta*	hairy umbrellawort
MONAFIS	f	*Monarda fistulosa*	wild bergamot
OENONUT	f	*Oenothera nuttallii*	white evening-primrose
OPUNFRA	f	*Opuntia fragilis*	brittle prickly-pear
OPUNPOL	f	*Opuntia polyacantha*	prickly pear
ORTHLUT	f	*Orthocarpus luteus*	owl-clover
ORTHSEC	f	*Orthilia secunda*	one-sided wintergreen
ORYZASP	g	*Oryzopsis asperifolia*	white-grained mountain rice grass
ORYZHYM	g	*Oryzopsis hymenoides*	Indian rice grass
ORYZPUN	g	*Oryzopsis pungens*	northern rice grass
OXYTMON	f	*Oxytropis monticola*	late yellow locoweed
OXYTSER	f	*Oxytropis sericea*	early yellow locoweed
PARNPAL	f	*Parnassia palustris*	northern grass-of-parnassus
PELTSPP	l	*Peltigera* spp.	lichen

Code	Form	Scientific Name	Common Name
PETAPUR	f	*Petalostemon purpureum*	purple prairie-clover
POA PRA	g	*Poa pratensis*	Kentucky bluegrass
POA SAN	g	*Poa sandbergii*	Sandberg bluegrass
POPUBAL	t	*Populus balsamifera*	balsam poplar
POPUTRE	t	*Populus tremuloides*	aspen
POTEANS	f	*Potentilla anserina*	silverweed
POTEPEN	f	*Potentilla pensylvanica*	prairie cinquefoil
PRUNPEN	s	*Prunus pensylvanica*	pin cherry
PRUNVIR	s	*Prunus virginiana*	choke cherry
PSORARG	f	*Psoralea argophylla*	silverleaf psoralea
PUCCNUT	g	*Puccinellia nuttalliana*	Nuttall's salt-meadow grass
PYROASA	f	*Pyrola asarifolia*	common pink wintergreen
RANUCYM	f	*Ranunculus cymbalaria*	seaside buttercup
RHUDRAD	s	*Rhus radicans*	poison ivy
RIBELAC	s	*Ribes lacustre*	bristly black currant
RIBEOXY	s	*Ribes oxycanthoides*	northern gooseberry
ROSAACI	s	*Rosa acicularis*	prickly rose
ROSAARK	s	*Rosa arkansana*	prairie rose
ROSAWOO	s	*Rosa woodsii*	common wild rose
RUBUIDA	s	*Rubus idaeus*	wild red raspberry
RUBUPUB	s	*Rubus pubescens*	dewberry
RUMEOCC	f	*Rumex occidentalis*	western dock
SALIBEB	s	*Salix bebbiana*	beaked willow
SALICAN	s	*Salix candida*	hoary willow
SALIDIS	s	*Salix discolor*	pussy willow
SALILUT	s	*Salix lutea*	yellow willow
SALIPET	s	*Salix petiolaris*	basket willow
SALISER	s	*Salix serissima*	autumn willow
SALISPP	s	*Salix* spp.	willow
SALSKOL	f	*Salsola kali*	Russian-thistle
SCHIPUR	g	*Schizachne purpurascens*	purple oat grass
SCIRACU	g	*Scirpus acutus*	great bulrush
SCIRCES	g	*Scirpus cespitosus*	tufted bulrush
SCIRPAU	g	*Scirpus paludosus*	prairie bulrush
SCIRPUN	g	*Scirpus pungens*	three-square rush
SCIRVAL	g	*Scirpus validus*	common great bulrush
SCOLFES	g	*Scolochloa festucacea*	spangletop
SCUTGAL	f	*Scutellaria galericulata*	marsh skullcap
SENESPP	f	*Senecio spp*	ragwort
SHEPCAN	s	*Shepherdia canadensis*	Canada buffaloberry
SISYMON	f	*Sisyrinchium montanum*	common blue-eyed grass
SMILSTE	f	*Smilacina stellata*	star-flowered Solomon's seal
SOLICAN	f	*Solidago canadensis*	Canada goldenrod
SOLIMIS	f	*Solidago missouriensis*	low goldenrod
SONCARV	f	*Sonchus arvensis*	perennial sow-thistle
SPIRALB	s	*Spiraea alba*	narrow-leaved meadowsweet
SPORCRY	g	*Sporobolus cryptandrus*	sand dropseed
STACPAL	f	*Stachys palustris*	marsh hedge-nettle
STELLOG	f	*Stellaria longipes*	long-stalked chickweed
STIPCOM	g	*Stipa comata*	needle-and-thread
STIPCUR	g	*Stipa curtiseta*	western porcupine grass
STIPVIR	g	*Stipa viridula*	green needle grass
SUAECAL	f	*Suaeda calceoliformis*	western sea-blight
SYMPALB	s	*Symphoricarpos albus*	snowberry
SYMPOCC	s	*Symphoricarpos occidentalis*	buckbrush
THALVEN	f	*Thalictrum venulosum*	veiny meadow rue
THERRHO	f	*Thermopsis rhombifolia*	golden bean
TRAGDUB	f	*Tragopogon dubius*	common goat's beard
TRIGMAR	f	*Triglochin maritima*	seaside arrow-grass
TYPHLAT	f	*Typha latifolia*	common cattail
VICIAME	f	*Vicia americana*	wild vetch
VIOLADU	f	*Viola adunca*	early blue violet
VIOLCAN	f	*Viola canadensis*	western Canada violet
VIOLNEP	f	*Viola nephrophylla*	bog violet
VIOLREN	f	*Viola renifolia*	kidney-leaved violet
ZIZIAPT	f	*Zizia aptera*	heart-leaved Alexanders

Appendix 5: Description of Site and Soil Characteristics associated with the Level 3 Vegetation Community Descriptions

Full definitions of the following terms are provided in Ecological Land Survey Site Description Manual (1994), The Canadian System of Soil Classification (Soil Classification Working Group, 1998), and the Physical Land Classification Methodology (Kocaoglu, 1990).

1. Slope:

   Slope at each field site representing a particular vegetation community falls into one of the following classes:

   - 0 - 0.5%
   - 0.5 - 2.5%
   - 3 - 5%
   - 6 - 9%
   - 10 - 15%
   - 16 - 30%
   - 31 - 45%
   - 46 - 70%
   - 71 - 100%
   - >100%

2. Aspect:

   Slope aspect or direction at each field site was classified as one of following cardinal directions: N, NE, E, SE, S, SW, W, NW. If there was no measureable slope the site was classed as level.

3. Parent Material represents the surficial geologic deposits and terrain features at each field site. Parent material observed in the Park during 1998 field investigations were:

   - GF - Glaciofluvial
   - E - Eolian
   - M - Moraine
   - GL - Glaciolacustrine
   - L - Lacustrine
   - N - Organic (fen peat)
   - OW - Open Water

Appendix 5 continued.......

4. Soil Subgroups encountered at the field sites:

   - O.DB - Orthic Dark Brown Chernozem
   - R.DB - Rego Dark Brown Chernozem
   - O.R - Orthic Regosol
   - CU.R - Cumulic Regosol
   - GL.R - Gleyed Regosol
   - GLCU.R - Gleyed Cumulic Regosol
   - GL.HR - Gleyed Humic Regosol
   - GLSZ.BL - Gleyed Solonetzic Black Chernozem
   - O.BL - Orthic Black Chernozem
   - R.G - Rego Gleysol
   - R.G (saline) - Rego Gleysol saline phase
   - R.G (peaty) - Rego Gleysol peaty phase
   - T.H - Terric Humisol
   - TY.H - Typic Humisol
   - HY.H - Hydric Humisol
   - T.F - Terric Fibrisol

5. The full range of drainage classes listed on the Site Description Form (LISD 15B (Rev. 1/97) and their corresponding number codes:

   - very rapidly - 1
   - rapidly - 2
   - well -3
   - moderately well - 4
   - imperfectly - 5
   - poorly - 6
   - very poorly - 6

6. The full range of Ecological Moisture Regime classes on the Site Description Form (LISD 15B (Rev. 1/97) and their corresponding number codes; indicated in the vegetation community descriptions as "Moisture":

   - very xeric (very dry) -1
   - xeric (dry) - 2
   - subxeric (moderately dry) - 3
   - submesic (moderately fresh) - 4
   - mesic (fresh) - 5
   - subhygric (moderately moist) - 6
   - hygric (moist) - 7
   - subhydric (moderately wet) - 8
   - hydric (wet) -9

Appendix 5 continued.......

7. The full range of Nutrient Regime classes on the Site Description Form (LISD 15B (Rev. 1/97) and their corresponding number codes; indicated in the vegetation community as "Nutrients":

   - oligotrophic (very poor) - 1
   - submesotrophic (poor) - 2
   - mesotrophic (medium) - 3
   - permesotrophic (rich) - 4
   - eutrophic (very rich) - 5
   - hypereutrophic (e.g. saline) - 6

8. Terrain surface expression attributes describing field sites in Appendix 1:

   - l - level
   - u - undulating
   - s - steep
   - h - hummocky
   - i - inclined
   - p - pitted
   - t - terraced
   - r - ridged
   - k - subdued
   - e - depressional
   - E - eroded
   - F - failing

DILLBERRY LAKE PROVINCIAL PARK NATURAL HISTORY THEME CLASSIFICATION (describes classification on Maps 2, 3, 4 and 5)

LEVEL 1 - Landforms and Surficial Materials					**LEVEL 2**		**LEVEL 3**	**Associated Field Sample Sites**
Type	**Theme**	**Landforms**	**Slope**	**Drainage Class**	**Broad Vegetation Class and Associated Soil Great Groups**		**Vegetation Communities (in bold) and Soil Subgroups observed during 1997 Summer Field Season**	
SANDY UPLAND	Dune Field	**E1** Undulating to ridged stabilized eolian dune field with occasional active sand dunes; includes a high relief hummocky ridged upland with extensive active and semi-active dunes on coarse sandy glaciofluvial ice contact (kame) deposits south of Long Lake.	3 to 45% with occasional dune slopes as high as 75%	Rapid to very rapid	Active Dunes - **AD**	Active Dunes (Regosols)	**Sand Grass - Sand Dropseed - June Grass - Blunt Sedge** (Orthic Regosols)	25a, 34, 89
					Grasslands - **G**	Dwarf Shrublands (Regosols)	**Creeping Juniper** (Orthic Regosols)	5, 21, 28
						Grasslands (Regosols & Dark Brown Chernozems)	**Western Porcupine Grass - June Grass - Slender Wheat Grass / Reindeer Lichen** (Orthic Regosols)	4a, 13
							Needle Grass - June Grass - Wheat Grass (Orthic Dark Brown Chernozems)	1
					Shrublands	Low Shrublands - **LS**		
						Tall Shrublands - **TS** (Regosols and Dark Brown Chenozems)	**Aspen Shrub - Saskatoon - Choke Cherry / Buckbrush** (Orthic Regosols)	27
							Aspen Shrub - Saskatoon - Choke Cherry / Rose (Cumulic Regosols & Rego Dark Brown Chernozems)	20, 26
					Woodlands - **W**	Aspen Woodlands (Dark Brown Chernozems)	**Aspen / Aspen Shrub - Choke Cherry - Saskatoon / Creeping Juniper - Common Bearberry** (Orthic Dark Brown Chernozems)	90
							Aspen / Aspen Shrub - Saskatoon - Choke Cherry / Buckbrush (Orthic Dark Brown Chernozems & Rego Dark Brown Chernozems)	2, 83
							Aspen / Rose - Buckbrush (Orthic Dark Brown Chernozems & Rego Dark Brown Chernozems)	6, 7
							Aspen / Aspen Shrub - Saskatoon - Choke Cherry / Rose (Raspberry) (Orthic Dark Brown Chernozems & Rego Dark Brown Chernozems)	10, 33
					Anthropogenic - **A**			

LEVEL 1 - Landforms and Surficial Materials					LEVEL 2		LEVEL 3	Associated Field Sample Sites
Type	Theme	Landforms	Slope	Drainage Class	Broad Vegetation Class and Associated Soil Great Groups		Vegetation Communities (in bold) and Soil Subgroups observed during 1997 Summer Field Season	
	Moderate Relief Sandhills	**E2** Undulating to hummocky uplands consisting of eolian sands deposited on coarse textured glaciofluvial ice contact (kame) material with occasional veneers and blankets of sandy eolian (wind modified glaciofluvial material) deposits over medium textured morainal material.	2 to 15%	Rapid to well	Grasslands - **G**	Dwarf Shrublands (Dark Brown Chernozems)	**Creeping Juniper** (Orthic Dark Brown Chernozems)	30, 36
						Grasslands (Dark Brown Chernozems)	**Needle Grass - June Grass - Wheat Grass** (Orthic Dark Brown Chernozems)	29
					Shrublands	Low Shrublands - **LS** (Dark Brown Chernozems)		
						Tall Shrublands -**TS** (Dark Brown Chernozems)	**Aspen Shrub - Saskatoon - Choke Cherry / Buckbrush** (Orthic Dark Brown Chernozems)	8, 15, 31, 86
					Woodlands - **W**	Aspen Woodlands (Dark Brown Chernozems)	**Aspen / Rose - Buckbrush** (Orthic Dark Brown Chernozems)	16, 18
							Aspen / Aspen Shrub - Saskatoon - Choke Cherry / Rose (Raspberry) (Orthic Dark Brown Chernozems)	3, 14, 35
					Anthropogenic - **A**			
	Sandy Plain	**E3** Undulating to low relief hummocky eolian landforms consisting of sand with occasional low relief stabilized dune ridges; this terrain is more level than the E1 and E2 classes; some evidence of past cultivation.	2 -12%	Rapid	Grasslands - **G**	Dwarf Shrubland (Regosols)	**Common Bearberry** (Orthic Regosols)	12
						Grasslands (Dark Brown Chernozems)	**Western Porcupine Grass - June Grass - Slender Wheat Grass / Reindeer Lichen** (Orthic Dark Brown Chernozems)	9
							Needle Grass - June Grass - Wheat Grass (Orthic Dark Brown Chernozems)	22
							Crested Wheat Grass - Western Wheat Grass (disturbed sites) (Orthic Dark Brown Chernozems)	17, 19
					Shrublands	Low Shrublands - **LS**		
						Tall Shrublands - **TS** (Dark Brown Chernozems)	**Aspen Shrub / Creeping Juniper / Reindeer Lichen** (Orthic Dark Brown Chernozems)	11

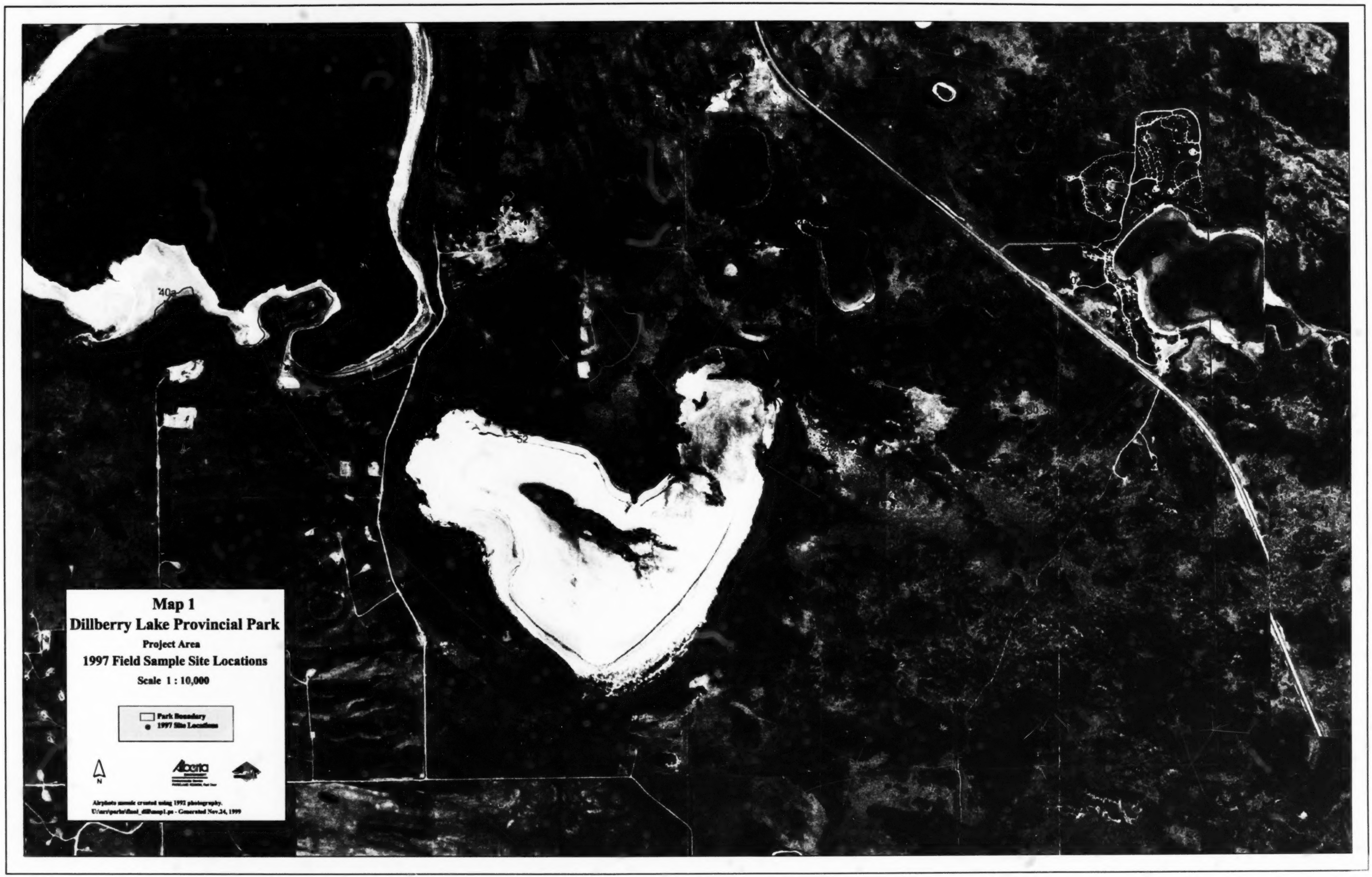
LEVEL 1 - Landforms and Surficial Materials					**LEVEL 2** **Broad Vegetation Class and Associated Soil Great Groups**		**LEVEL 3** **Vegetation Communities (in bold) and Soil Subgroups observed during 1997 Summer Field Season**	**Associated Field Sample Sites**
Type	**Theme**	**Landforms**	**Slope**	**Drainage Class**				
					Woodlands – **W** (cont'd)	Aspen Woodlands; (Dark Brown Chernozems)	**Aspen / Aspen Shrub - Saskatoon - Choke Cherry / Creeping Juniper - Common Bearberry** (Rego Dark Brown Chernozems)	87
					Anthropogenic - **A**			
	Kame Moraine	**GF1** Undulating to hummocky glaciofluvial uplands overlain with sandy ice contact (kame) deposits and occasional coarse sandy glaciofluvial veneers and blankets over medium textured till; this landform represents some of the highest terrain in the Park.	5 to 20%	Rapid to well	Grasslands - **G**	Dwarf Shrublands (Dark Brown Chernozems)	**Creeping Juniper** (Orthic Dark Brown Chernozems)	65, 67, 71, 77
						Grasslands (Dark Brown Chernozems)	**Needle and Thread Grass - June Grass - Slender Wheat Grass - Blunt Sedge** (Orthic Dark Brown Chernozems)	44, 46, 48, 54, 55
					Shrublands	Low Shrublands - **LS** (Dark Brown Chernozems)	**Buckbrush** (Orthic Dark Brown Chernozems)	39
							Silverberry (Orthic Dark Brown Chernozems)	69
							Rose; (Rego Dark Brown Chernozems)	47
						Tall Shrublands - **TS** (Dark Brown Chernozems & Regosols)	**Aspen Shrub / Creeping Juniper / Reindeer Lichen** (Orthic Dark Brown Chernozems)	58
							Aspen Shrub - Saskatoon - Choke Cherry / Buckbrush (Orthic Dark Brown Chernozems)	72
							Aspen Shrub - Saskatoon - Choke Cherry / Rose (Orthic Regosols)	42
							Caragana / Smooth Brome (Disturbance community) (Orthic Dark Brown Chernozems)	79
					Woodlands – **W**	Aspen Woodlands (Dark Brown Chernozems & Cumulic Regosols)	**Aspen / Aspen Shrub - Saskatoon - Choke Cherry / Creeping Juniper - Common Bearberry** (Orthic Dark Brown Chernozems)	59
							Aspen / Rose - Buckbrush (Orthic Dark Brown Chernozems)	53

LEVEL 1 - Landforms and Surficial Materials					**LEVEL 2** **Broad Vegetation Class and Associated Soil Great Groups**		**LEVEL 3** **Vegetation Communities (in bold) and Soil Subgroups observed during 1997 Summer Field Season**	**Associated Field Sample Sites**
Type	**Theme**	**Landforms**	**Slope**	**Drainage Class**				
					Woodlands		**Aspen / Aspen Shrub - Saskatoon - Choke Cherry / Rose (Raspberry)** (Orthic Dark Brown Chernozems)	82
							Aspen / Rose - Raspberry (Gleyed Cumulic Regosols)	45
					Anthropogenic - **A**			
		GF2 Moderately to strongly sloping terrain underlain with coarse sandy glaciofluvial ice contact (kame) deposits; this class has the steepest slopes of all the GF classes.	8 to 65%	Rapid	Grasslands - **G**	Dwarf Shrubland		
						Grasslands (Dark Brown Chernozems)	**Pasture Sagewort / June Grass - Blunt Sedge** (Rego Dark Brown Chernozems)	66
					Shrublands	Low Shrublands - **LS**		
						Tall Shrublands - **TS**	**Aspen Shrub - Saskatoon - Choke Cherry / Buckbrush** (Orthic Dark Brown Chernozems)	70
					Woodlands - **W**	Aspen Woodlands (Dark Brown Chernozems & Cumulic Regosols)	**Aspen / Aspen Shrub - Saskatoon - Choke Cherry / Buckbrush** (Orthic Dark Brown Chernozems)	62
							Choke Cherry / Rose (Raspberry) (Cumulic Regosols & Orthic Dark Brown Chernozems)	49, 63
		GF3 Undulating low relief glaciofluvial lowlands underlain by coarse textured sandy ice contact (kame) deposits; located east of Highway 17 along the northern boundary of the Park.	0 to 10%	Rapid	Grasslands - **G**	Dwarf Shrublands (Dark Brown Chernozems)	**Creeping Juniper** (Orthic Dark Brown Chernozems)	78
						Grasslands		
					Shrublands	Low Shrublands - **LS** (Dark Brown Chernozems)	**Buckbrush** (Rego Dark Brown Chernozems)	73
							Aspen Shrub / Creeping Juniper (Orthic Dark Brown Chernozems)	75
						Tall Shrublands - **TS**		
					Woodlands - **W**	Aspen Woodlands (Dark Brown Chernozems)	**Aspen / Aspen Shrub - Saskatoon - Choke Cherry / Buckbrush** (Orthic Dark Brown Chernozems)	68
					Anthropogenic - **A**			

LEVEL 1 - Landforms and Surficial Materials					**LEVEL 2** **Broad Vegetation Class and Associated Soil Great Groups**		**LEVEL 3** **Vegetation Communities (in bold) and Soil Subgroups observed during 1997 Summer Field Season**	**Associated Field Sample Sites**
Type	**Theme**	**Landforms**	**Slope**	**Drainage Class**				
		GF4 Level to undulating coarse gravelly glaciofluvial (kame) deposits south of Killarney Lake; very good source of industrial aggregate as evidenced by an active gravel pit.	0 to 15%	Rapid	Grasslands - **G**	Grasslands (Dark Brown Chernozems)	**Pasture Sagewort - June Grass - Blunt Sedge** (Orthic Dark Brown Chernozems)	37
					Shrublands	Low Shrublands - **LS**		
						Tall Shrublands - **TS**		
					Woodlands - **W**	Woodlands		
					Anthropogenic - **A**			
	Lacustrine	**L3** Level to gently undulating higher sandy beach terraces often located between a lower L2 beach terrace and slopes descending from eolian and glaciofluvial uplands.	0 to 5%	Well to imperfect	Shrublands	Low Shrublands - **LS**		
						Tall Shrublands - **TS**		
					Woodlands - **W**	Aspen Woodlands (Humic Regosols)	**Aspen / Aspen Shrubs - Saskatoon - Choke Cherry / Rose (Raspberry)** (Gleyed Humic Regosols)	56
						Balsam Poplar Woodlands (Regosols)	**Balsam Poplar / Willow** (Water Birch) (Gleyed Regosols)	24
NON SANDY UPLAND	Ground Moraine	**M1** Level to gently undulating morainal depression in a small area located south of Killarney Lake in the western portion of the project area; morainal deposit textures range from medium to fine.	0 to 4%	Imperfect	Grasslands - **G**	Grasslands (Black Chernozems)	**Green Needle Grass - Sandberg Bluegrass - Blunt Sedge** (Gleyed Solonetzic Black Chernozems)	43
	Glacial Lake Bed	**GL1** Level to undulating lowland south of Killarney Lake overlain by medium textured glaciolacustrine veneers and blankets over medium textured morainal deposits.	5 to 8%	Moderately well	Shrublands	Low Shrublands - **LS**		
						Tall Shrublands - **TS**		
					Woodlands - **W**	Aspen Woodlands (Black Chernozems)	**Aspen / Rose - Raspberry** (Orthic Black Chernozems)	38
WETLAND	Lacustrine	**L1** Level recently exposed coarse to fine textured, saline lake bottom sediments in a zone between open water in the	0 - 2 %	Poor	Marsh - **WMS**	Saline Shallow Marsh (Gleysols & Regosols)	**Three-Square Rush - Foxtail Barley - Nuttall's Salt-Meadow Grass** (Rego Gleysols & Gleyed Regosols)	40b, 52

LEVEL 1 - Landforms and Surficial Materials					LEVEL 2		LEVEL 3	Associated Field Sample Sites
Type	Theme	Landforms	Slope	Drainage Class	Broad Vegetation Class and Associated Soil Great Groups		Vegetation Communities (in bold) and Soil Subgroups observed during 1997 Summer Field Season	
		centre of Killarney, Leane and Speedy Lakes and perimeter beach terraces.			Wet Meadows - **WM**	Wet Meadows (Gleysols)	**Sow-thistle/Three-Square Rush - Foxtail Barley** (Rego Gleysols)	60
					Saline Flats - **SF**	Saline Flats (Gleysols)	**Non-vegetated** (Rego Gleysols)	40a
		L2 Level to gently undulating lower sandy beach terraces along the perimeter of lakes such as Killarney, Leane, Dillberry, Ranger and Speedy Lakes; some evidence of wind modification of these beach deposits around larger lakes; this predominantly wetland landform includes a narrow band of drier sites adjacent to the higher beach terrace represented by L3; these drier sites were included as part of the L2 because they were small and scattered occurrences which are not easily mapped.	0 - 5%	Predominantly poorly drained with inclusions of imperfectly to well drained sites in a transition zone with the higher L3 beach terrace.	Marsh - **WMS**	Saline Shallow Marsh (Gleysols)	**Three-Square Rush - Foxtail Barley - Nuttall's Salt-Meadow Grass** (Rego Gleysols)	57
						Saline Deep Marsh (Gleysols)	**Great Bulrush / Liverworts** (Rego Gleysols)	23
					Wet Meadows - **WM**	Wet Meadows (Regosols & Gleysols)	**Northern Reed Grass - Wire Rush** (Orthic Regosols. & Rego Gleysols)	51, 61
							Sow-thistle / Three-square Rush - Foxtail Barley (Orthic Regosols)	80
					Saline Flats - **SF**	Saline Flats (Gleysols)	**Non-vegetated** (Rego Gleysols)	
					Sandy Beach - **SB**			
					Shrublands	Low Shrublands - **LS** (Regosols)	**Silverberry Meadow** (Orthic Regosols & Gleyed Regosols)	41, 81
						Tall Shrublands - **TS**		
					Woodlands - **W**	Balsam Poplar Woodlands (Gleysols)	**Balsam Poplar / Willow (Water Birch)** (Rego Gleysols)	50
					Grasslands - **G**			
		L4 A band of coarse to fine textured lacustrine sediments along the shoreline of Long Lake; lake sediments are at or below the lake water level	0 to 1%	Very poor	Marsh - **WMS**	Fresh Deep Marsh (Gleysols)	**Common Cattail** (Rego Gleysols)	observed around Long Lake
						Fresh Shallow Marsh; (Gleysols)		

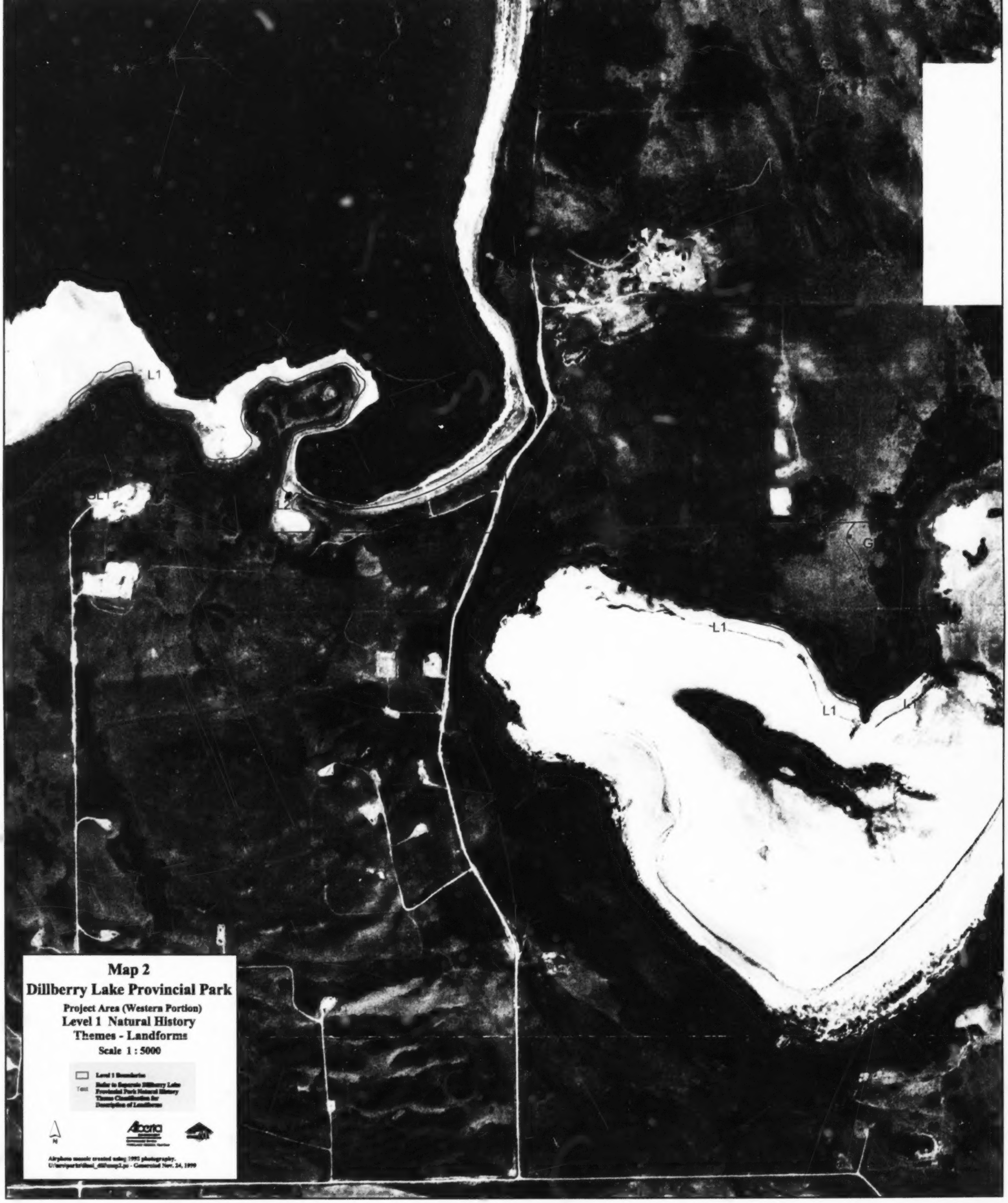
LEVEL 1 - Landforms and Surficial Materials					**LEVEL 2**		**LEVEL 3**	**Associated Field Sample Sites**
Type	**Theme**	**Landforms**	**Slope**	**Drainage Class**	**Broad Vegetation Class and Associated Soil Great Groups**		**Vegetation Communities (in bold) and Soil Subgroups observed during 1997 Summer Field Season**	
	Organic	**N1** Level saline to non-saline organic deposits; mostly humic in composition	0 to 1%	Poor to very poor	Wet Meadows - **WM**	Wet Meadows (Humisols)	**Sow-thistle - Canada Goldenrod / Northern Reed Grass - Spangletop** (Typic Humisols)	64a, 74, 76
					Marsh - **WMS**	Fresh Deep Marsh (Humisols)	**Common Bulrush** (Typic Humisols & Terric Humisols)	64, 88
					Shrublands	Wet Tall Shrublands - **TSW**		
		N2 Level floating fen along the shoreline in the extreme eastern portion of Long Lake; includes narrow, scattered patches of N1 organic veneers and blankets over coarse sandy material in a transition zone with eolian uplands; N1 areas were too small to map out separately and were included as part of N2.	0%	Very poor	Floating Fen - **FF**	Floating Shrubby Fen (Humisols)	**Dwarf Birch / Water Sedge / Brown Moss** (Hydric Humisols)	84
					Shrublands	Wet Tall Shrublands - **TSW**	**Red-osier Dogwood - Willow** (Rego Gleysols - peaty phase)	85
	Open Water	**OW** Open Water	0%		Fresh Water	Fresh to Slightly Saline Water	Dillberry Lake, Long Lake, Ranger Lake, Speedy Lake	
					Saline Water	Saline Water	Leane Lake, Killarney Lake	


40a
52
02
89
30
Park Boundary
1997 Site Locations
N

Map 1
Dillberry Lake Provincial Park
Project Area
1997 Field Sample Site Locations
Scale 1 : 10,000

Airphoto mosaic created using 1992 photography.
U:\arc\parks\final_dillmap1.ps - Generated Nov.24, 1999

This map has been reduced from the original (36 x 48). The scale as indicated by the representative fraction (1:10000), is no longer valid.



Map 2

Dillberry Lake Provincial Park

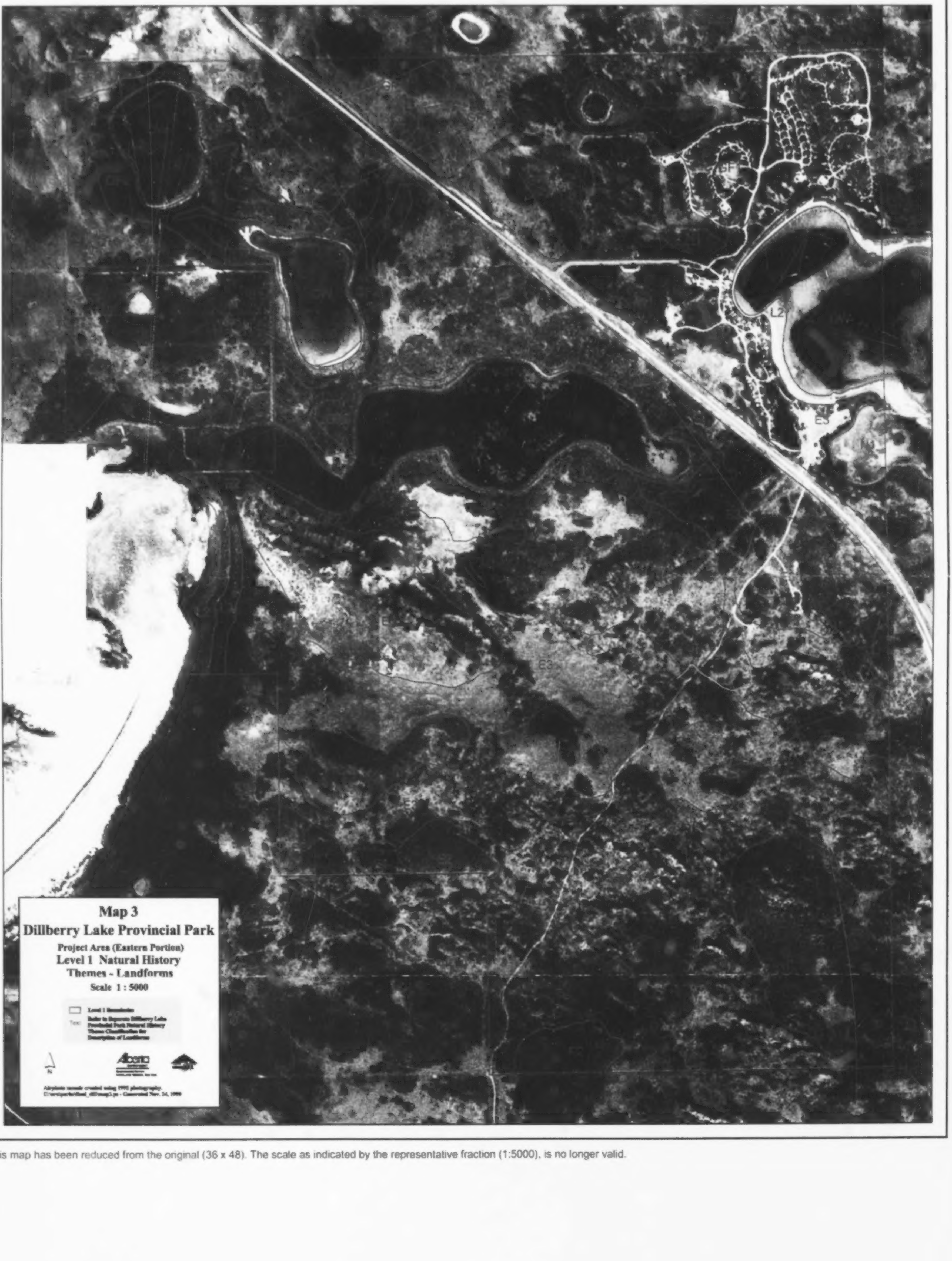
Project Area (Western Portion)

Level 1 Natural History

Themes - Landforms

Scale 1 : 5000

This map has been reduced from the original (36 x 48). The scale as indicated by the representative fraction (1:5000), is no longer valid.

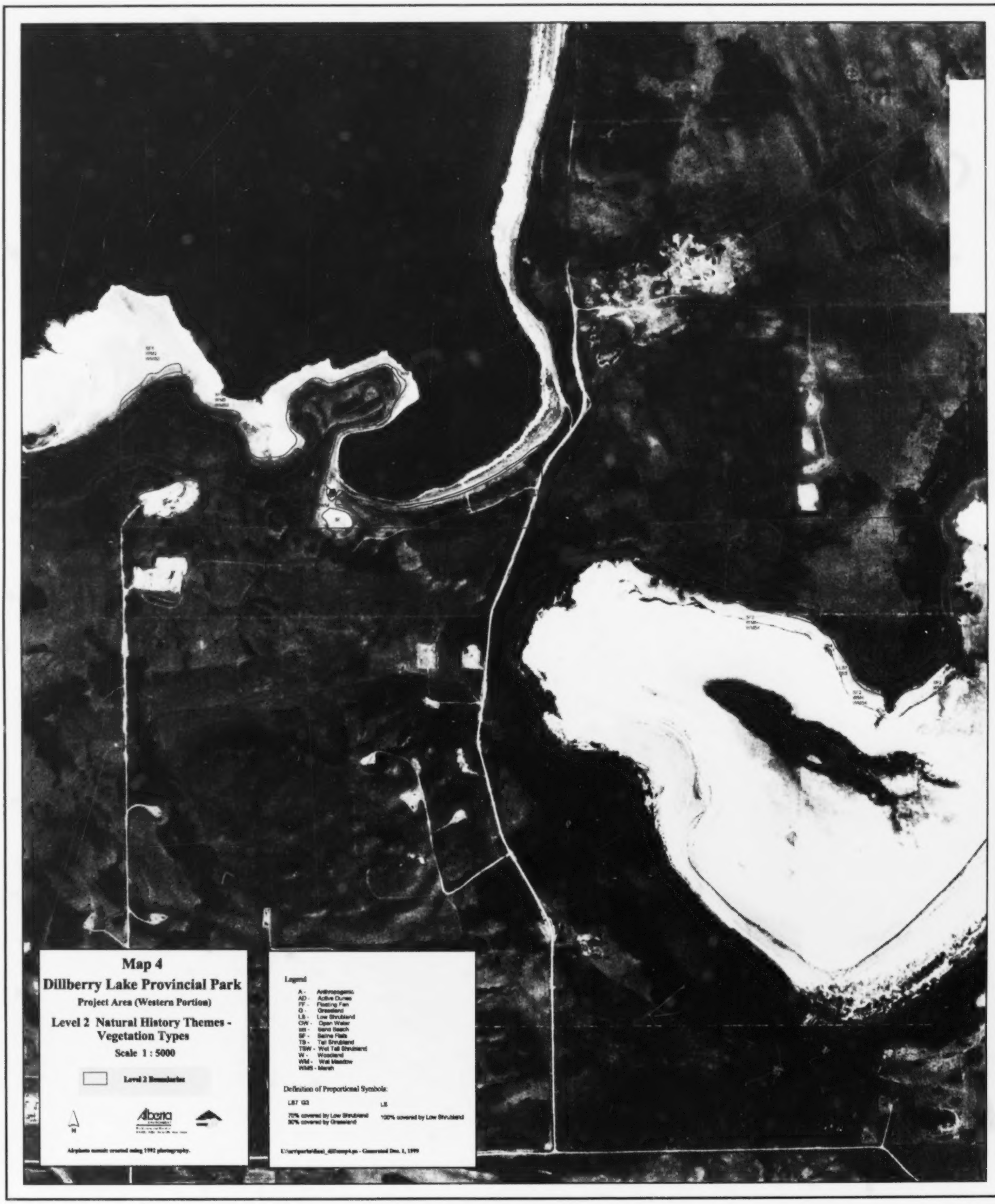

L2
E3
E3
E3
N

Map 3
Dillberry Lake Provincial Park
Project Area (Eastern Portion)
Level 1 Natural History
Themes - Landforms
Scale 1 : 5000

Level 1 Boundaries
Text Refer to Separate Dillberry Lake Provincial Park Natural History Theme Classification for Description of Landforms
Alberta

Airphoto mosaic created using [illegible] photography.
[illegible] - Generated Nov. 24, [illegible]

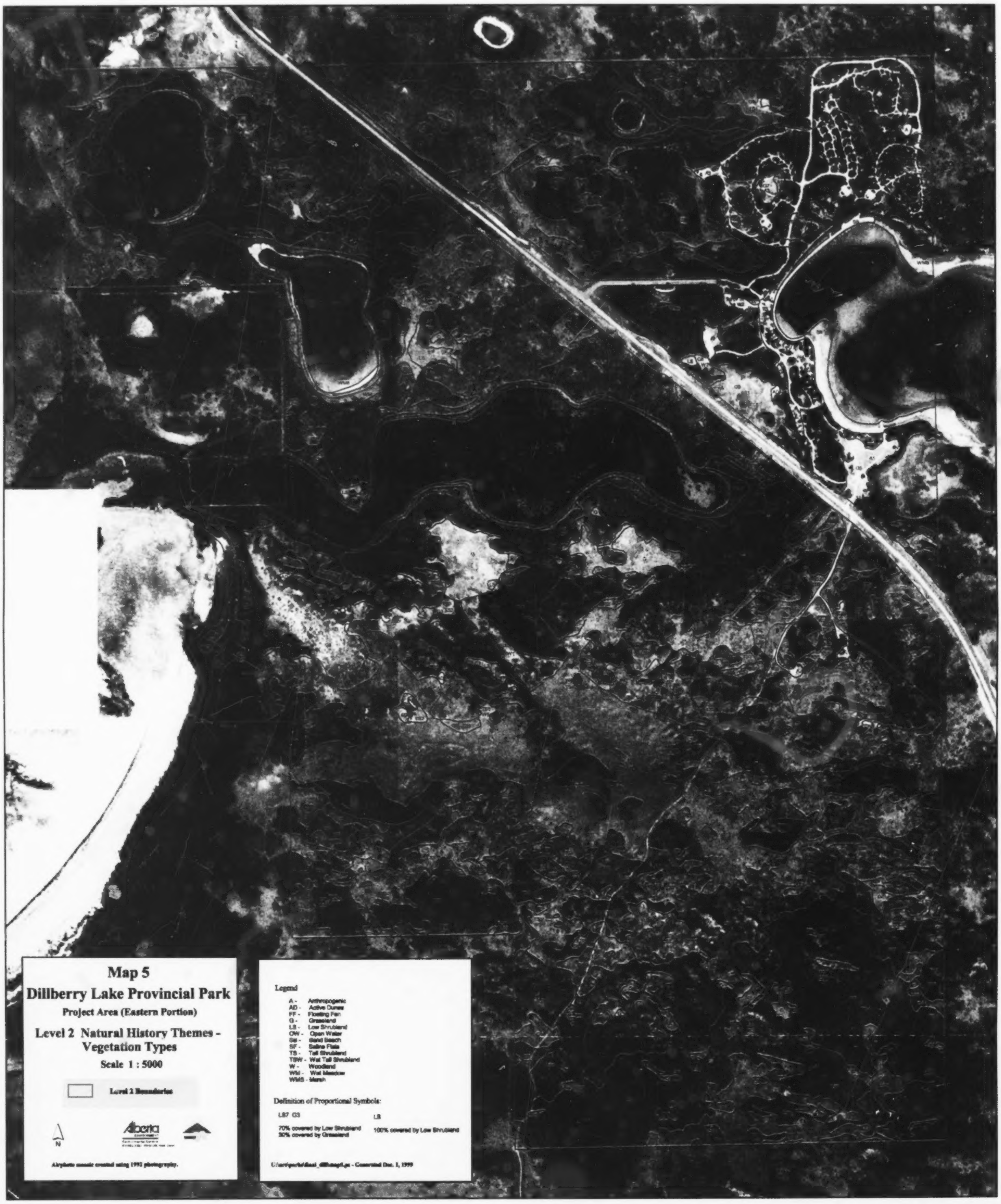
This map has been reduced from the original (36 x 48). The scale as indicated by the representative fraction (1:5000), is no longer valid.


Level 2 Boundaries
N
Alberta
Legend
A - Anthropogenic
AD - Active Dunes
FF - Floating Fen
G - Grassland
LS - Low Shrubland
OW - Open Water
sb - Sand Beach
SF - Saline Flats
TS - Tall Shrubland
TSW - Wet Tall Shrubland
W - Woodland
WM - Wet Meadow
WMS - Marsh
Definition of Proportional Symbols:
LS7 G3
70% covered by Low Shrubland
30% covered by Grassland
LS
100% covered by Low Shrubland
U:/carr/parks/final_dill/map4.ps - Generated Dec. 1, 1999

Map 4
Dillberry Lake Provincial Park
Project Area (Western Portion)
Level 2 Natural History Themes - Vegetation Types
Scale 1 : 5000

Airphoto mosaic created using 1992 photography.

This map has been reduced from the original (36 x 48). The scale as indicated by the representative fraction (1:5000), is no longer valid.



Map 5
Dillberry Lake Provincial Park
Project Area (Eastern Portion)
Level 2 Natural History Themes - Vegetation Types
Scale 1 : 5000
Level 2 Boundaries
N
Alberta
Airphoto mosaic created using 1992 photography.
Legend
A - Anthropogenic
AD - Active Dunes
FF - Floating Fen
G - Grassland
LS - Low Shrubland
OW - Open Water
Sb - Sand Beach
SF - Saline Flats
TS - Tall Shrubland
TSW - Wet Tall Shrubland
W - Woodland
WM - Wet Meadow
WMS - Marsh
Definition of Proportional Symbols:
LS7 G3
70% covered by Low Shrubland
30% covered by Grassland
LS
100% covered by Low Shrubland
- Generated Dec. 1, 1999

his map has been reduced from the original (36 x 48). The scale as indicated by the representative fraction (1:5000), is no longer valid.